The Nautical Almanac 2019

The Nautical Almanac

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fair winds, clear skies & following seas
TheNauticalAlmanac.com

2019

January

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

February

M	Tu	W	Th	F	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

March

M	Tu	W	Th	F	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

April

M	Tu	W	Th	F	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

May

M	Tu	W	Th	F	Sa	Su
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

June

M	Tu	W	Th	F	Sa	Su
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

July

M	Tu	W	Th	F	Sa	Su
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

August

M	Tu	W	Th	F	Sa	Su
			1	2	3	4
5	6	7	8	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30	31	

September

M	Tu	W	Th	F	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30						

October

M	Tu	W	Th	F	Sa	Su
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

November

M	Tu	W	Th	F	Sa	Su
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

December

M	Tu	W	Th	F	Sa	Su
						1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	31					

Day of Week & Day of Year

2019	1		2		3		4		5		6	
	January		February		March		April		May		June	
Day of Month	Day of Week	Day of Year	Day of Week	Day of Year	Day of Week	Day of Year	Day of Week	Day of Year	Day of Week	Day of Year	Day of Week	Day of Year
1	Tue	1	Fri	32	Fri	60	Mon	91	Wed	121	Sat	152
2	Wed	2	Sat	33	Sat	61	Tue	92	Thu	122	Sun	153
3	Thu	3	Sun	34	Sun	62	Wed	93	Fri	123	Mon	154
4	Fri	4	Mon	35	Mon	63	Thu	94	Sat	124	Tue	155
5	Sat	5	Tue	36	Tue	64	Fri	95	Sun	125	Wed	156
6	Sun	6	Wed	37	Wed	65	Sat	96	Mon	126	Thu	157
7	Mon	7	Thu	38	Thu	66	Sun	97	Tue	127	Fri	158
8	Tue	8	Fri	39	Fri	67	Mon	98	Wed	128	Sat	159
9	Wed	9	Sat	40	Sat	68	Tue	99	Thu	129	Sun	160
10	Thu	10	Sun	41	Sun	69	Wed	100	Fri	130	Mon	161
11	Fri	11	Mon	42	Mon	70	Thu	101	Sat	131	Tue	162
12	Sat	12	Tue	43	Tue	71	Fri	102	Sun	132	Wed	163
13	Sun	13	Wed	44	Wed	72	Sat	103	Mon	133	Thu	164
14	Mon	14	Thu	45	Thu	73	Sun	104	Tue	134	Fri	165
15	Tue	15	Fri	46	Fri	74	Mon	105	Wed	135	Sat	166
16	Wed	16	Sat	47	Sat	75	Tue	106	Thu	136	Sun	167
17	Thu	17	Sun	48	Sun	76	Wed	107	Fri	137	Mon	168
18	Fri	18	Mon	49	Mon	77	Thu	108	Sat	138	Tue	169
19	Sat	19	Tue	50	Tue	78	Fri	109	Sun	139	Wed	170
20	Sun	20	Wed	51	Wed	79	Sat	110	Mon	140	Thu	171
21	Mon	21	Thu	52	Thu	80	Sun	111	Tue	141	Fri	172
22	Tue	22	Fri	53	Fri	81	Mon	112	Wed	142	Sat	173
23	Wed	23	Sat	54	Sat	82	Tue	113	Thu	143	Sun	174
24	Thu	24	Sun	55	Sun	83	Wed	114	Fri	144	Mon	175
25	Fri	25	Mon	56	Mon	84	Thu	115	Sat	145	Tue	176
26	Sat	26	Tue	57	Tue	85	Fri	116	Sun	146	Wed	177
27	Sun	27	Wed	58	Wed	86	Sat	117	Mon	147	Thu	178
28	Mon	28	Thu	59	Thu	87	Sun	118	Tue	148	Fri	179
29	Tue	29	Fri		Fri	88	Mon	119	Wed	149	Sat	180
30	Wed	30			Sat	89	Tue	120	Thu	150	Sun	181
31	Thu	31			Sun	90			Fri	151		

Day of Week & Day of Year

2019	7		8		9		10		11		12	
	July		August		September		October		November		December	
Day of Month	**Day of Week**	**Day of Year**	**Day of Week**	**Day of Year**	**Day of Week**	**Day of Year**	**Day of Week**	**Day of Year**	**Day of Week**	**Day of Year**	**Day of Week**	**Day of Year**
1	Mon	182	Thu	213	Sun	244	Tue	274	Fri	305	Sun	335
2	Tue	183	Fri	214	Mon	245	Wed	275	Sat	306	Mon	336
3	Wed	184	Sat	215	Tue	246	Thu	276	Sun	307	Tue	337
4	Thu	185	Sun	216	Wed	247	Fri	277	Mon	308	Wed	338
5	Fri	186	Mon	217	Thu	248	Sat	278	Tue	309	Thu	339
6	Sat	187	Tue	218	Fri	249	Sun	279	Wed	310	Fri	340
7	Sun	188	Wed	219	Sat	250	Mon	280	Thu	311	Sat	341
8	Mon	189	Thu	220	Sun	251	Tue	281	Fri	312	Sun	342
9	Tue	190	Fri	221	Mon	252	Wed	282	Sat	313	Mon	343
10	Wed	191	Sat	222	Tue	253	Thu	283	Sun	314	Tue	344
11	Thu	192	Sun	223	Wed	254	Fri	284	Mon	315	Wed	345
12	Fri	193	Mon	224	Thu	255	Sat	285	Tue	316	Thu	346
13	Sat	194	Tue	225	Fri	256	Sun	286	Wed	317	Fri	347
14	Sun	195	Wed	226	Sat	257	Mon	287	Thu	318	Sat	348
15	Mon	196	Thu	227	Sun	258	Tue	288	Fri	319	Sun	349
16	Tue	197	Fri	228	Mon	259	Wed	289	Sat	320	Mon	350
17	Wed	198	Sat	229	Tue	260	Thu	290	Sun	321	Tue	351
18	Thu	199	Sun	230	Wed	261	Fri	291	Mon	322	Wed	352
19	Fri	200	Mon	231	Thu	262	Sat	292	Tue	323	Thu	353
20	Sat	201	Tue	232	Fri	263	Sun	293	Wed	324	Fri	354
21	Sun	202	Wed	233	Sat	264	Mon	294	Thu	325	Sat	355
22	Mon	203	Thu	234	Sun	265	Tue	295	Fri	326	Sun	356
23	Tue	204	Fri	235	Mon	266	Wed	296	Sat	327	Mon	357
24	Wed	205	Sat	236	Tue	267	Thu	297	Sun	328	Tue	358
25	Thu	206	Sun	237	Wed	268	Fri	298	Mon	329	Wed	359
26	Fri	207	Mon	238	Thu	269	Sat	299	Tue	330	Thu	360
27	Sat	208	Tue	239	Fri	270	Sun	300	Wed	331	Fri	361
28	Sun	209	Wed	240	Sat	271	Mon	301	Thu	332	Sat	362
29	Mon	210	Thu	241	Sun	272	Tue	302	Fri	333	Sun	363
30	Tue	211	Fri	242	Mon	273	Wed	303	Sat	334	Mon	364
31	Wed	212	Sat	243			Thu	304			Tue	365

Useful Information

Time Signals- by telephone

WWV 303-499-7111 **WWVH** 808-335-4363

CHU **English:** 613-745-1576 (CHU provides only Eastern time announcements)
French: 613-745-9426

Time signals- by Radio

WWV (Fort Collins, Colorado) 2.5, 5, 10, 15, 20 MHz (male voice)
WWVH (Kauai, Hawaii) 2.5, 5, 10, 15 MHz (female voice)
CHU (Ottawa, Canada) 3330, 7850, and 14,670 kHz (USB)

Bowditch *2017- The American Practical Navigator*

https://TheNauticalAlmanac.com/2017_Bowditch-_American_Practical_Navigator.html

Organized in a convenient and useful manner. Download the Chapters, Parts or Tables you want or the entire work.

The Terrestrial Almanac Annual calendar and day planner for the entire year.

https://TheNauticalAlmanac.com/TerrestrialAlmanac.html

Pub. No. 249 Download individual Latitudes or Volumes

https://TheNauticalAlmanac.com/Pub. No. 249.html

Pub. No. 229 Download individual Volumes covering a range of Latitudes

https://TheNauticalAlmanac.com/Pub. No. 229.html

Sight Reduction Forms & Methods

https://www.TheNauticalAlmanac.com/Methods.html

Celestial Navigation
useful Formulas

About Calculators

The Casio *fx-300ES Plus* is an inexpensive calculator at about 11 USD. It features *natural input* so you enter a formula just as it would be written on paper. Entering degrees, minutes and seconds is very simple. The Casio *fx-300ES Plus* has 9 memory locations and you can review many of the previous entries you make using a special key on the calculator.

Determine Hc using a calculator

The formula

Hc = asin[sin(**Declination**)*sin(**Latitude**) + cos(**Latitude**)*cos(**Declination**)*cos(**LHA**)]

As it would be entered into the Casio calculator Note- Sin^{-1} is the arc-sin key

Sin^{-1}(Sin(**Ap Latitude**) x Sin(**Declination**) + Cos(**Ap Latitude)** x Cos(**Declination**) x Cos(**LHA**)

Declination is the declination of the Celestial body you're observing. When the heavenly body's declination is *Contrary name* to your Ap Latitude enter a negative sign before it.

Latitude is the Latitude where you are, think you are or where you would like to determine Hc for. Typically, you'll be using an *Assumed position Latitude* or *Ap Latitude* as it's called.

In Western Longitudes

LHA is the Local Hour Angle which is derived from subtracting your whole number value of Longitude (Assumed or otherwise) from the whole number value of ***GHA*** (Greenwich Hour Angle).

In Eastern Longitudes

LHA, *i*n ***Eastern Longitudes,*** is determined by rounding up the GHA figure to the next highest whole degree figure then adding the DR. Longitude to GHA to obtain LHA. Only add the whole degree DR. Longitude figure to the rounded up whole degree GHA figure. If the resulting LHA figure is greater than 360° then subtract 360° from the figure to obtain the LHA.

Why would you want to determine Hc using a calculator?

It's faster than looking up in Pub. No. 249 and Pub. No. 229, highly accurate and you don't need a lot of printed out pages of Latitudes from Pub. No. 249 and Pub. No. 229. Pub. No. 249 Vol. 2 & 3 don't cover any declination greater than 29 degrees so you'd have to use Pub. No. 229 which is extremely large.

Celestial Navigation

Determine Z

Z = acos[(sin(**Declination**) – sin(**Ap Latitude)** x sin(**Hc**)) ÷ (cos(**Ap Latitude**) x cos(**Hc**))]

As it would be entered into the Casio calculator... Note- Cos^{-1} is the arc-cosine key

Cos^{-1}((Sin(**Declination**) – Sin(**AP Latitude**) x Sin(**Hc**)) ÷ (Cos(**AP Latitude**) x Cos(**Hc**)

If the heavenly body's declination is *Contrary name* to the Ap Latitude enter a negative sign before it.

To obtain Zn see the rules below for Northern and Southern latitudes.

Determine Z independent of Hc

$$Z = \tan^{-1}\left(\frac{\sin \text{LHA}}{(\cos \text{L} \tan \text{d}) - (\sin \text{L} \cos \text{LHA})}\right)$$

"L" is latitude and "*d"* is declination. When the heavenly body's declination is *Contrary name* to your Ap Latitude enter a negative sign before it.

As it would be entered into the Casio calculator... Note- $\tan^{-1}$ is the arc-tangent key

Z = $\tan^{-1}$ ((sin (**LHA**) ÷ (cos(**AP latitude**) x tan(**declination**) – (sin(**AP latitude**) x cos(**LHA**))

The sign convention used in the calculation of this azimuth formula is as follows:
from *Bowditch Chapter 22 CALCULATIONS AND CONVERSIONS, page 331*

1) If latitude and declination are of contrary name, declination is treated as a negative quantity;
2) If the local hour angle is greater than 180°, it is treated as a negative quantity. If the azimuth angle as calculated is negative, add 180° to obtain the desired value.

To obtain Zn apply the following rules

In Northern Latitudes	**In Southern Latitudes**
LHA greater than 180°....Zn=Z LHA less than 180°...........Zn=360° – Z	LHA greater than 180°....Zn= 180° – Z LHA less than 180°...........Zn= 180° + Z

Determine Refraction 0.96 ÷ Tan of (Ha)

Determine Dip using feet 0.97 x (Square Root of *He* (Height of Eye) in feet)

Determine Dip using meters 1.76 x (Square Root of *He* (Height of eye) in meters)

Rules to Calculate Latitude using the Sun- *Noon-Sight*

1- Latitude and declination *Same name* but latitude is greater than declination:

Latitude= (90° – Ho) + declination

2- Latitude and declination *Same name* but declination greater than latitude:

Latitude= Declination – (90° – Ho)

3- Latitude and declination *Contrary name*:

Latitude= (90° – Ho) – Declination

To get AP longitude (needed for plotting the LOP)

In Western longitudes

Combine the DR Longitude figure with only the minutes (of arc) of the total GHA figure. The Ap λ figure will be used when plotting the LOP on the UPS.

In Eastern longitudes

In Eastern longitudes the Ap λ is determined as follows;

DR longitude + (0°60' *minus* GHA minutes of arc)

Example- E 075° + (0°60' – 0° 02')= 75° 58' Ap longitude

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Explanation of The Nautical Almanac Daily Pages

1	Date based on GMT/UT
2	Time based on GMT/UT (this is just integral hour only)
3	**Mer. pass**- meridian passage of Aries at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
4	GHA ***v*** correction and Declination ***d*** correction. The amount to correct ***v*** and ***d*** for is determined by the minutes and seconds of time of the planet observation and is found in the *Increments and Corrections* pages of The Nautical Almanac. The Increments and Corrections pages are also known as *The Yellow Pages* as that's the color of the paper in the USNO published Nautical Almanac.
4a	**m-** is the *magnitude* or brightness of the planet. A bright planet will have a *minus* sign beside the figure. A fainter planet will have no sign beside its magnitude figure.
5	**Stars**- **SHA**, *Sidereal Hour Angle*, and **Declination**. 59 stars are listed. Typically, only 57 stars are used for navigational purposes in both Northern and Southern Hemispheres.
6	**Mer. pass**- planet meridian passage time at the Prime Meridian- Greenwich- 0°. Time figure is GMT/UT.
7	**SHA-** planet *SHA* at the time of meridian passage at the Prime Meridian- Greenwich- 0°. Planet SHA is calculated by subtracting planet GHA from Aries GHA. Time figure is GMT/UT.
8	**Horizontal parallax**- for Venus and Mars.
9	Date based on GMT/UT
10	Time based on GMT/UT (this is just integral hour only)
11	**SD**- Semi-diameter of the Sun. One half of the angular width of the Sun as observed on earth.
12	**d**- the amount the declination of the Sun changes per hour. If there's a minus sign beside the declination figure in the **Dec** column then the Sun is in the Southern hemisphere.
13	The Moon's GHA ***v*** correction. The amount to correct the Moon's GHA using ***v*** is determined by the minutes and seconds of time of the Moon's observation and is found in the *Increments and Corrections* pages of The Nautical Almanac. The Increments and Corrections pages are also known as *The Yellow Pages* as that's the color of the paper in the USNO published Nautical Almanac.
14	**SD**- Semi-diameter of the Moon. One half of the angular width of the Moon, as observed on earth.
15	The Moon's declination **d** correction. It's the amount of declination the Moon changes per hour. However the amount to correct the Moon's declination using **d** is determined by the minutes and seconds of time of the Moon's observation and is found in the *Increments and Corrections* pages of The Nautical Almanac. The **d** correction is *algebraically* added. An easy way to determine whether to *add* or *subtract* the **d** correction found in the *Increments and Corrections* pages is by examining the Moon's declination trend in The Nautical Almanac. If the declination is increasing (regardless of its sign + or -) from the integral hour of the observation you made then add the **d** increment and increase the value of the declination. If the declination is decreasing (regardless of its sign + or -) from the integral hour of the observation you made then subtract the **d** increment and decrease the value of the declination. Make sure to put the sign "back on" the corrected declination so you know which hemisphere the Moon's in. The Increments and Corrections pages are also known as *The Yellow Pages* as that's the color of the paper in the USNO published Nautical Almanac.
16	**HP**- the angle between two lines, one from the center of the Moon to the center of the Earth, the other from the center of the Moon to the edge of the Earth. This angle is about 56', but it changes slightly from day to day as the distance to the Moon changes along its elliptical path around the Earth. *Source- starpath.com*
17	**Sun- Eqn. of Time**- Equation of Time is the difference between GMT/UT and LAN at Greenwich. The figures listed are for GMT/UT at 00^h and 12^h. If you look at **Mer. Pass** just to the right of the **Eqn. of Time** you'll find, approximately, when the Sun crosses The Prime Meridian (at Greenwich). The figures in the 12^h column indicate, approximately, how many minutes and seconds are subtracted, or added, to 12 to determine when Local Apparent Noon is at The Prime Meridian. You can calculate, approximately, when LAN is at your Longitude by adding, or subtracting the amount of time difference between you and

	Greenwich and the Equation of Time.
17 *continued*	**Example**- May 30, 2016. **Mer. Pass** is at UT 11:57. **12ʰ** is 02:25. This means *subtract* 2 minutes and 25 seconds from UT 12 to calculate when Meridian Passage is at Greenwich. So at W 075° meridian passage would occur at about- 12 hours + 5 hours *MINUS* 2 minutes and 25 seconds, or UT 16:57:35.
18	**Sun- Mer. Pass** just to the right of the **Eqn. of Time** is the approximate GMT/UT when the Sun crosses The Prime Meridian (at Greenwich) for that specific date.
19	**Moon- Mer. Pass**- is the approximate GMT/UT when the Moon crosses The Prime Meridian (at Greenwich) or The International Date Line for that specific date. **Upper** means the GMT/UT when the Moon crosses The Prime Meridian (Greenwich) and **Lower** means the GMT/UT when the Moon crosses The International Date Line (180°).
20	**Moon- Age-** this is the number of days past a new Moon. Typically, there are 29 days in a lunar month.
20 *continued*	**Moon- %-** the amount of the Moon's illumination. 100% would be a full moon. 49% would be about ½ of the Moon is illuminated.
21* *see note at bottom*	**(morning) Twilight- Naut.**- the approximate GMT/UT when morning Nautical Twilight begins. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is visible enough to be used for marine sextant observations. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time.
21* *see note at bottom*	**(morning) Twilight- Civil-** the approximate GMT/UT of morning civil twilight starts when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time.
21* *see note at bottom*	**Sunrise-** the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time.
21* *see note at bottom*	**(evening) Twilight- Naut.**- the approximate GMT/UT of when evening Nautical Twilight ends. Nautical twilight is the time when the center of the sun is 12° below the horizon and the horizon is no longer visible enough to be used for sextant observations. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time.
21* *see note at bottom*	**(evening) Twilight- Civil-** the approximate GMT/UT of evening civil twilight that ends when the geometric center of the sun is 6° below the horizon. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time.
21* *see note at bottom*	**Sunset-** the approximate GMT/UT when the Sun is 0° 50' (semi-diameter plus refraction) below the horizon. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time.
22* *see note at bottom*	**Moonrise**- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time under the specific day. The USNO has a more detailed explanation of this here- http://aa.usno.navy.mil/faq/docs/RST_defs.php
22* *see note at bottom*	**Moonset**- the approximate GMT/UT when the Moon is about 0° 05' to 0° 10' below the horizon. First locate your approximate Latitude in the **Lat**. column and then follow across horizontally to the right to find the time under the specific day. The USNO has a more detailed explanation of this here- http://aa.usno.navy.mil/faq/docs/RST_defs.php

* **Note**- Time of Sunrise, Sunset, Moonrise, Moonset and twilight is based on GMT/UT of the event at 0° (Greenwich). To determine the GMT/UT time at your Longitude add or subtract the time difference between your AP Longitude and Greenwich.

September 21, 22 ,23 (Wed., Thu., Fri.)

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	0° 18.0	155° 19.9	-10° 05.0	94° 50.0	-25° 54.0	177° 35.7	0° 01.1	110° 41.9	-20° 37.5
1	15° 20.5	170° 19.5	-10° 06.2	109° 50.7	-25° 54.0	192° 37.7	0° 00.9	125° 44.2	-20° 37.6
2	30° 23.0	185° 19.1	-10° 07.4	124° 51.4	-25° 54.0	207° 39.7	0° 00.6	140° 46.5	-20° 37.6
3	45° 25.4	200° 18.7	-10° 08.6	139° 52.1	-25° 54.0	222° 41.6	0° 00.4	155° 48.8	-20° 37.6
4	60° 27.9	215° 18.4	-10° 09.8	154° 52.8	-25° 54.1	237° 43.6	0° 00.2	170° 51.1	-20° 37.6
5	75° 30.3	230° 18.0	-10° 11.0	169° 53.5	-25° 54.1	252° 45.6	-0° 00.0	185° 53.4	-20° 37.7
6	90° 32.8	245° 17.6	-10° 12.2	184° 54.2	-25° 54.1	267° 47.6	-0° 00.2	200° 55.7	-20° 37.7
7	105° 35.3	260° 17.2	-10° 13.4	199° 54.9	-25° 54.1	282° 49.5	-0° 00.4	215° 58.0	-20° 37.7
8	120° 37.7	275° 16.8	-10° 14.6	214° 55.6	-25° 54.1	297° 51.5	-0° 00.6	231° 00.3	-20° 37.8
9	135° 40.2	290° 16.4	-10° 15.8	229° 56.3	-25° 54.2	312° 53.5	-0° 00.9	246° 02.6	-20° 37.8
10	150° 42.7	305° 16.0	-10° 17.0	244° 57.0	-25° 54.2	327° 55.4	-0° 01.1	261° 04.9	-20° 37.8
11	165° 45.1	320° 15.6	-10° 18.2	259° 57.7	-25° 54.2	342° 57.4	-0° 01.3	276° 07.3	-20° 37.8
12	180° 47.6	335° 15.3	-10° 19.4	274° 58.4	-25° 54.2	357° 59.4	-0° 01.5	291° 09.6	-20° 37.9
13	195° 50.1	350° 14.9	-10° 20.6	289° 59.1	-25° 54.2	13° 01.3	-0° 01.7	306° 11.9	-20° 37.9
14	210° 52.5	5° 14.5	-10° 21.8	304° 59.8	-25° 54.2	28° 03.3	-0° 01.9	321° 14.2	-20° 37.9
15	225° 55.0	20° 14.1	-10° 23.1	320° 00.5	-25° 54.3	43° 05.3	-0° 02.1	336° 16.5	-20° 38.0
16	240° 57.5	35° 13.7	-10° 24.3	335° 01.2	-25° 54.3	58° 07.2	-0° 02.4	351° 18.8	-20° 38.0
17	255° 59.9	50° 13.3	-10° 25.5	350° 01.9	-25° 54.3	73° 09.2	-0° 02.6	6° 21.1	-20° 38.0
18	271° 02.4	65° 12.9	-10° 26.7	5° 02.6	-25° 54.3	88° 11.2	-0° 02.8	21° 23.4	-20° 38.0
19	286° 04.8	80° 12.5	-10° 27.9	20° 03.3	-25° 54.3	103° 13.1	-0° 03.0	36° 25.7	-20° 38.1
20	301° 07.3	95° 12.1	-10° 29.1	35° 04.0	-25° 54.3	118° 15.1	-0° 03.2	51° 28.0	-20° 38.1
21	316° 09.8	110° 11.8	-10° 30.3	50° 04.7	-25° 54.3	133° 17.1	-0° 03.4	66° 30.3	-20° 38.1
22	331° 12.2	125° 11.4	-10° 31.5	65° 05.4	-25° 54.4	148° 19.1	-0° 03.6	81° 32.6	-20° 38.2
23	346° 14.7	140° 11.0	-10° 32.7	80° 06.1	-25° 54.4	163° 21.0	-0° 03.9	96° 34.9	-20° 38.2
Mer.pass.:23:54		v-0.4 d-1.2 m-3.8		v0.7 d-0.0 m-0.1		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	1° 17.2	155° 10.6	-10° 33.9	95° 06.8	-25° 54.4	178° 23.0	-0° 04.1	111° 37.2	-20° 38.2
1	16° 19.6	170° 10.2	-10° 35.1	110° 07.5	-25° 54.4	193° 25.0	-0° 04.3	126° 39.5	-20° 38.2
2	31° 22.1	185° 09.8	-10° 36.3	125° 08.2	-25° 54.4	208° 26.9	-0° 04.5	141° 41.8	-20° 38.3
3	46° 24.6	200° 09.4	-10° 37.4	140° 08.8	-25° 54.4	223° 28.9	-0° 04.7	156° 44.1	-20° 38.3
4	61° 27.0	215° 09.0	-10° 38.6	155° 09.5	-25° 54.4	238° 30.9	-0° 04.9	171° 46.4	-20° 38.3
5	76° 29.5	230° 08.6	-10° 39.8	170° 10.2	-25° 54.4	253° 32.8	-0° 05.1	186° 48.7	-20° 38.4
6	91° 32.0	245° 08.2	-10° 41.0	185° 10.9	-25° 54.5	268° 34.8	-0° 05.4	201° 51.0	-20° 38.4
7	106° 34.4	260° 07.8	-10° 42.2	200° 11.6	-25° 54.5	283° 36.8	-0° 05.6	216° 53.4	-20° 38.4
8	121° 36.9	275° 07.4	-10° 43.4	215° 12.3	-25° 54.5	298° 38.7	-0° 05.8	231° 55.7	-20° 38.4
9	136° 39.3	290° 07.0	-10° 44.6	230° 13.0	-25° 54.5	313° 40.7	-0° 06.0	246° 58.0	-20° 38.5
10	151° 41.8	305° 06.6	-10° 45.8	245° 13.7	-25° 54.5	328° 42.7	-0° 06.2	262° 00.3	-20° 38.5
11	166° 44.3	320° 06.3	-10° 47.0	260° 14.4	-25° 54.5	343° 44.6	-0° 06.4	277° 02.6	-20° 38.5
12	181° 46.7	335° 05.9	-10° 48.2	275° 15.1	-25° 54.5	358° 46.6	-0° 06.6	292° 04.9	-20° 38.6
13	196° 49.2	350° 05.5	-10° 49.4	290° 15.8	-25° 54.5	13° 48.6	-0° 06.9	307° 07.2	-20° 38.6
14	211° 51.7	5° 05.1	-10° 50.6	305° 16.5	-25° 54.5	28° 50.5	-0° 07.1	322° 09.5	-20° 38.6
15	226° 54.1	20° 04.7	-10° 51.8	320° 17.1	-25° 54.5	43° 52.5	-0° 07.3	337° 11.8	-20° 38.7
16	241° 56.6	35° 04.3	-10° 53.0	335° 17.8	-25° 54.5	58° 54.5	-0° 07.5	352° 14.1	-20° 38.7
17	256° 59.1	50° 03.9	-10° 54.2	350° 18.5	-25° 54.5	73° 56.5	-0° 07.7	7° 16.4	-20° 38.7
18	272° 01.5	65° 03.5	-10° 55.4	5° 19.2	-25° 54.6	88° 58.4	-0° 07.9	22° 18.7	-20° 38.7
19	287° 04.0	80° 03.1	-10° 56.6	20° 19.9	-25° 54.6	104° 00.4	-0° 08.1	37° 21.0	-20° 38.8
20	302° 06.4	95° 02.7	-10° 57.7	35° 20.6	-25° 54.6	119° 02.4	-0° 08.4	52° 23.3	-20° 38.8
21	317° 08.9	110° 02.3	-10° 58.9	50° 21.3	-25° 54.6	134° 04.3	-0° 08.6	67° 25.6	-20° 38.8
22	332° 11.4	125° 01.9	-11° 00.1	65° 22.0	-25° 54.6	149° 06.3	-0° 08.8	82° 27.9	-20° 38.9
23	347° 13.8	140° 01.5	-11° 01.3	80° 22.6	-25° 54.6	164° 08.3	-0° 09.0	97° 30.2	-20° 38.9
Mer.pass.:23:50		v-0.4 d-1.2 m-3.8		v0.7 d-0.0 m-0.0		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	2° 16.3	155° 01.1	-11° 02.5	95° 23.3	-25° 54.6	179° 10.2	-0° 09.2	112° 32.5	-20° 38.9
1	17° 18.8	170° 00.7	-11° 03.7	110° 24.0	-25° 54.6	194° 12.2	-0° 09.4	127° 34.8	-20° 38.9
2	32° 21.2	185° 00.3	-11° 04.9	125° 24.7	-25° 54.6	209° 14.2	-0° 09.6	142° 37.1	-20° 39.0
3	47° 23.7	199° 59.9	-11° 06.1	140° 25.4	-25° 54.6	224° 16.1	-0° 09.9	157° 39.4	-20° 39.0
4	62° 26.2	214° 59.5	-11° 07.3	155° 26.1	-25° 54.6	239° 18.1	-0° 10.1	172° 41.7	-20° 39.0
5	77° 28.6	229° 59.1	-11° 08.4	170° 26.7	-25° 54.6	254° 20.1	-0° 10.3	187° 44.0	-20° 39.1
6	92° 31.1	244° 58.7	-11° 09.6	185° 27.4	-25° 54.6	269° 22.0	-0° 10.5	202° 46.3	-20° 39.1
7	107° 33.6	259° 58.3	-11° 10.8	200° 28.1	-25° 54.6	284° 24.0	-0° 10.7	217° 48.6	-20° 39.1
8	122° 36.0	274° 57.9	-11° 12.0	215° 28.8	-25° 54.6	299° 26.0	-0° 10.9	232° 50.9	-20° 39.2
9	137° 38.5	289° 57.5	-11° 13.2	230° 29.5	-25° 54.6	314° 27.9	-0° 11.1	247° 53.2	-20° 39.2
10	152° 40.9	304° 57.1	-11° 14.4	245° 30.2	-25° 54.6	329° 29.9	-0° 11.4	262° 55.5	-20° 39.2
11	167° 43.4	319° 56.7	-11° 15.6	260° 30.8	-25° 54.6	344° 31.9	-0° 11.6	277° 57.8	-20° 39.2
12	182° 45.9	334° 56.3	-11° 16.7	275° 31.5	-25° 54.6	359° 33.9	-0° 11.8	293° 00.1	-20° 39.3
13	197° 48.3	349° 55.9	-11° 17.9	290° 32.2	-25° 54.6	14° 35.8	-0° 12.0	308° 02.4	-20° 39.3
14	212° 50.8	4° 55.5	-11° 19.1	305° 32.9	-25° 54.6	29° 37.8	-0° 12.2	323° 04.7	-20° 39.3
15	227° 53.3	19° 55.0	-11° 20.3	320° 33.6	-25° 54.6	44° 39.8	-0° 12.4	338° 07.0	-20° 39.4
16	242° 55.7	34° 54.6	-11° 21.5	335° 34.2	-25° 54.6	59° 41.7	-0° 12.6	353° 09.3	-20° 39.4
17	257° 58.2	49° 54.2	-11° 22.7	350° 34.9	-25° 54.6	74° 43.7	-0° 12.9	8° 11.6	-20° 39.4
18	273° 00.7	64° 53.8	-11° 23.8	5° 35.6	-25° 54.6	89° 45.7	-0° 13.1	23° 13.9	-20° 39.4
19	288° 03.1	79° 53.4	-11° 25.0	20° 36.3	-25° 54.6	104° 47.6	-0° 13.3	38° 16.2	-20° 39.5
20	303° 05.6	94° 53.0	-11° 26.2	35° 37.0	-25° 54.6	119° 49.6	-0° 13.5	53° 18.5	-20° 39.5
21	318° 08.1	109° 52.6	-11° 27.4	50° 37.6	-25° 54.6	134° 51.6	-0° 13.7	68° 20.8	-20° 39.5
22	333° 10.5	124° 52.2	-11° 28.6	65° 38.3	-25° 54.6	149° 53.5	-0° 13.9	83° 23.1	-20° 39.6
23	348° 13.0	139° 51.8	-11° 29.7	80° 39.0	-25° 54.6	164° 55.5	-0° 14.1	98° 25.4	-20° 39.6
Mer.pass.:23:47		v-0.4 d-1.2 m-3.8		v0.7 d-0.0 m-0.0		v2.0 d-0.2 m-1.5		v2.3 d-0.0 m0.5	

Stars

Star	SHA	Dec
Alpheratz	357° 40.8	29° 11.1
Ankaa	353° 13.2	-42° 12.8
Schedar	349° 37.3	56° 37.7
Diphda	348° 53.3	-17° 53.6
Achernar	335° 24.7	-57° 09.0
Hamal	327° 58.0	23° 32.4
Polaris	316° 26.0	89° 19.8
Akamar	315° 16.4	-40° 14.2
Menkar	314° 12.5	4° 09.3
Mirfak	308° 36.8	49° 54.9
Aldebaran	290° 46.7	16° 32.4
Rigel	281° 09.9	-8° 11.0
Capella	280° 31.1	46° 00.6
Bellatrix	278° 29.6	6° 21.8
Elnath	278° 09.8	28° 37.1
Alnilam	275° 44.1	-1° 11.5
Betelgeuse	270° 58.9	7° 24.5
Canopus	263° 55.2	-52° 42.1
Sirius	258° 31.7	-16° 44.1
Adara	255° 10.9	-28° 59.6
Procyon	244° 57.5	5° 11.0
Pollux	243° 25.1	27° 59.0
Avior	234° 17.4	-59° 33.6
Suhail	222° 51.1	-43° 29.9
Miaplacidus	221° 39.8	-69° 47.0
Alphard	217° 54.2	-8° 43.8
Regulus	207° 41.4	11° 53.2
Dubhe	193° 49.8	61° 39.6
Denebola	182° 31.7	14° 28.9
Gienah	175° 50.3	-17° 37.9
Acrux	173° 07.4	-63° 11.4
Gacrux	171° 58.9	-57° 12.3
Alioth	166° 19.4	55° 52.4
Spica	158° 29.2	-11° 14.7
Alcaid	152° 57.7	49° 14.1
Hadar	148° 45.2	-60° 27.1
Menkent	148° 05.3	-36° 27.0
Arcturus	145° 53.9	19° 06.3
Rigil Kent.	139° 49.1	-60° 54.2
Zubenelg.	137° 03.2	-16° 06.4
Kochab	137° 21.1	74° 05.6
Alphecca	126° 09.4	26° 39.9
Antares	112° 23.7	-26° 27.9
Atria	107° 23.6	-69° 03.4
Sabik	102° 10.1	-15° 44.5
Shaula	96° 19.0	-37° 06.8
Rasalhague	96° 04.5	12° 33.3
Etamin	90° 45.1	51° 29.7
Kaus Aust.	83° 40.8	-34° 22.4
Vega	80° 37.4	38° 48.4
Nunki	75° 55.5	-26° 16.4
Altair	62° 06.0	8° 55.0
Peacock	53° 15.5	-56° 40.8
Deneb	49° 29.7	45° 20.8
Enif	33° 44.7	9° 57.3
Alnair	27° 40.7	-46° 52.7
Fomalhaut	15° 21.3	-29° 31.9
Scheat	13° 50.9	28° 10.6
Markab	13° 35.8	15° 17.9

2016/9/2	SHA	Mer.pass
Venus	155° 01.9	13:39
Mars	94° 32.0	17:40
Jupiter	177° 17.7	12:08
Saturn	110° 23.8	16:35

2016/9/2	SHA	Mer.pass
Venus	153° 53.4	13:40
Mars	93° 49.6	17:39
Jupiter	177° 05.8	12:05
Saturn	110° 20.1	16:31

2016/9/2	SHA	Mer.pass
Venus	152° 44.8	13:40
Mars	93° 07.0	17:38
Jupiter	176° 53.9	12:02
Saturn	110° 16.2	16:27

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	181 44.1	0 37.3	304 57.5	6.7	14 25.9	7.3	60.0
1	196 44.3	0 36.3	319 23.2	6.7	14 33.2	7.2	60.0
2	211 44.5	0 35.3	333 48.9	6.7	14 40.4	7.1	59.9
3	226 44.7	0 34.4	348 14.6	6.7	14 47.5	7.0	59.9
4	241 45.0	0 33.4	2 40.3	6.7	14 54.5	6.9	59.9
5	256 45.2	0 32.4	17 06.0	6.7	15 01.3	6.8	59.9
6	271 45.4	0 31.5	31 31.7	6.7	15 08.1	6.7	59.9
7	286 45.6	0 30.5	45 57.4	6.7	15 14.8	6.6	59.8
8	301 45.8	0 29.5	60 23.0	6.6	15 21.4	6.5	59.8
9	316 46.1	0 28.5	74 48.6	6.6	15 27.8	6.4	59.8
10	331 46.3	0 27.6	89 14.3	6.6	15 34.2	6.3	59.8
11	346 46.5	0 26.6	103 39.9	6.6	15 40.4	6.2	59.8
12	1 46.7	0 25.6	118 05.5	6.6	15 46.6	6.1	59.7
13	16 46.9	0 24.7	132 31.1	6.6	15 52.6	6.0	59.7
14	31 47.2	0 23.7	146 56.7	6.6	15 58.5	5.9	59.7
15	46 47.4	0 22.7	161 22.3	6.6	16 04.3	5.8	59.7
16	61 47.6	0 21.7	175 47.9	6.6	16 10.0	5.6	59.6
17	76 47.8	0 20.8	190 13.5	6.6	16 15.6	5.5	59.6
18	91 48.1	0 19.8	204 39.1	6.6	16 21.1	5.4	59.6
19	106 48.3	0 18.8	219 04.7	6.6	16 26.5	5.3	59.6
20	121 48.5	0 17.8	233 30.3	6.6	16 31.7	5.2	59.5
21	136 48.7	0 16.9	247 55.8	6.6	16 36.9	5.1	59.5
22	151 48.9	0 15.9	262 21.4	6.6	16 41.9	5.0	59.5
23	166 49.2	0 14.9	276 47.0	6.6	16 46.8	4.9	59.5
	SD.=15.9	d=-1.0	S.D.=16.4				

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	181 49.4	0 14.0	291 12.6	6.6	16 51.6	4.7	59.4
1	196 49.6	0 13.0	305 38.2	6.6	16 56.3	4.6	59.4
2	211 49.8	0 12.0	320 03.7	6.6	17 00.9	4.5	59.4
3	226 50.0	0 11.0	334 29.3	6.6	17 05.4	4.4	59.4
4	241 50.3	0 10.1	348 54.9	6.6	17 09.7	4.3	59.3
5	256 50.5	0 09.1	3 20.5	6.6	17 13.9	4.2	59.3
6	271 50.7	0 08.1	17 46.1	6.6	17 18.0	4.1	59.3
7	286 50.9	0 07.1	32 11.7	6.6	17 22.0	3.9	59.3
8	301 51.1	0 06.2	46 37.3	6.6	17 25.9	3.8	59.2
9	316 51.4	0 05.2	61 03.0	6.6	17 29.7	3.7	59.2
10	331 51.6	0 04.2	75 28.6	6.6	17 33.4	3.6	59.2
11	346 51.8	0 03.3	89 54.2	6.6	17 36.9	3.5	59.2
12	1 52.0	0 02.3	104 19.9	6.7	17 40.3	3.4	59.1
13	16 52.2	0 01.3	118 45.5	6.7	17 43.6	3.2	59.1
14	31 52.5	0 00.3	133 11.2	6.7	17 46.8	3.1	59.1
15	46 52.7	-0 00.6	147 36.9	6.7	17 49.9	3.0	59.1
16	61 52.9	-0 01.6	162 02.6	6.7	17 52.8	2.9	59.0
17	76 53.1	-0 02.6	176 28.3	6.7	17 55.6	2.8	59.0
18	91 53.3	-0 03.6	190 54.0	6.7	17 58.4	2.7	59.0
19	106 53.6	-0 04.5	205 19.7	6.7	18 01.0	2.5	59.0
20	121 53.8	-0 05.5	219 45.5	6.8	18 03.4	2.4	58.9
21	136 54.0	-0 06.5	234 11.3	6.8	18 05.8	2.3	58.9
22	151 54.2	-0 07.4	248 37.1	6.8	18 08.0	2.2	58.9
23	166 54.4	-0 08.4	263 02.9	6.8	18 10.2	2.1	58.9
	SD.=15.9	d=-1.0	S.D.=16.2				

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	181 54.7	-0 09.4	277 28.7	6.8	18 12.2	1.9	58.8
1	196 54.9	-0 10.4	291 54.5	6.9	18 14.1	1.8	58.8
2	211 55.1	-0 11.3	306 20.4	6.9	18 15.8	1.7	58.8
3	226 55.3	-0 12.3	320 46.3	6.9	18 17.5	1.6	58.7
4	241 55.5	-0 13.3	335 12.2	6.9	18 19.0	1.5	58.7
5	256 55.7	-0 14.3	349 38.2	7.0	18 20.5	1.4	58.7
6	271 56.0	-0 15.2	4 04.1	7.0	18 21.8	1.2	58.7
7	286 56.2	-0 16.2	18 30.1	7.0	18 22.9	1.1	58.6
8	301 56.4	-0 17.2	32 56.1	7.0	18 24.0	1.0	58.6
9	316 56.6	-0 18.2	47 22.2	7.1	18 25.0	0.9	58.6
10	331 56.8	-0 19.1	61 48.2	7.1	18 25.8	0.8	58.6
11	346 57.1	-0 20.1	76 14.3	7.1	18 26.5	0.7	58.5
12	1 57.3	-0 21.1	90 40.5	7.1	18 27.1	0.5	58.5
13	16 57.5	-0 22.0	105 06.6	7.2	18 27.6	0.4	58.5
14	31 57.7	-0 23.0	119 32.8	7.2	18 28.0	0.3	58.4
15	46 57.9	-0 24.0	133 59.0	7.2	18 28.3	0.2	58.4
16	61 58.1	-0 25.0	148 25.3	7.3	18 28.4	0.1	58.4
17	76 58.4	-0 25.9	162 51.6	7.3	18 28.4	-0.0	58.4
18	91 58.6	-0 26.9	177 17.9	7.3	18 28.3	-0.1	58.3
19	106 58.8	-0 27.9	191 44.2	7.4	18 28.1	-0.3	58.3
20	121 59.0	-0 28.9	206 10.6	7.4	18 27.8	-0.4	58.3
21	136 59.2	-0 29.8	220 37.0	7.4	18 27.4	-0.5	58.3
22	151 59.5	-0 30.8	235 03.5	7.5	18 26.9	-0.6	58.2
23	166 59.7	-0 31.8	249 30.0	7.5	18 26.2	-0.7	58.2
	SD.=15.9	d=-1.0	S.D.=16.0				

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	03:00	04:32	05:40	18:02	19:10	20:40
70	03:20	04:40	05:41	18:01	19:03	20:21
68	03:36	04:46	05:42	18:01	18:56	20:06
66	03:48	04:52	05:43	18:00	18:51	19:54
64	03:58	04:56	05:44	17:60	18:47	19:45
62	04:06	05:00	05:45	17:59	18:43	19:37
60	04:13	05:03	05:45	17:59	18:40	19:30
58	04:19	05:06	05:45	17:58	18:37	19:24
56	04:24	05:09	05:46	17:58	18:35	19:19
54	04:29	05:11	05:46	17:58	18:33	19:15
52	04:33	05:13	05:47	17:58	18:31	19:11
50	04:36	05:14	05:47	17:57	18:30	19:08
45	04:44	05:18	05:47	17:57	18:26	19:00
40	04:49	05:21	05:48	17:57	18:24	18:55
35	04:53	05:23	05:48	17:56	18:22	18:51
30	04:57	05:25	05:48	17:56	18:20	18:48
20	05:01	05:27	05:49	17:56	18:18	18:43
10	05:04	05:28	05:49	17:56	18:17	18:41
0	05:05	05:29	05:49	17:56	18:16	18:40
-10	05:04	05:28	05:49	17:56	18:17	18:41
-20	05:02	05:27	05:49	17:56	18:18	18:44
-30	04:57	05:25	05:49	17:56	18:20	18:48
-35	04:54	05:24	05:49	17:57	18:22	18:51
-40	04:50	05:22	05:49	17:57	18:24	18:56
-45	04:45	05:19	05:48	17:57	18:27	19:01
-50	04:38	05:16	05:48	17:58	18:30	19:08
-52	04:35	05:14	05:48	17:58	18:32	19:12
-54	04:31	05:13	05:48	17:58	18:34	19:16
-56	04:26	05:10	05:48	17:59	18:36	19:20
-58	04:21	05:08	05:47	17:59	18:38	19:25
-60	04:16	05:05	05:47	17:59	18:41	19:31

Lat.	Moonrise Wed	Moonrise Thu	Moonrise Fri	Moonset Wed	Moonset Thu	Moonset Fri
72	18:08	17:50	-:-	14:16	16:35	-:-
70	18:50	19:09	19:53	13:35	15:15	16:30
68	19:19	19:48	20:37	13:07	14:37	15:46
66	19:40	20:15	21:06	12:46	14:10	15:17
64	19:58	20:36	21:28	12:29	13:49	14:55
62	20:12	20:53	21:45	12:15	13:33	14:37
60	20:24	21:07	21:60	12:04	13:19	14:23
58	20:35	21:19	22:12	11:53	13:07	14:10
56	20:44	21:30	22:23	11:45	12:57	13:59
54	20:52	21:39	22:33	11:37	12:48	13:50
52	20:60	21:47	22:41	11:30	12:40	13:41
50	21:06	21:54	22:49	11:24	12:32	13:34
45	21:20	22:10	23:05	11:10	12:17	13:17
40	21:32	22:23	23:19	10:59	12:04	13:04
35	21:42	22:35	23:30	10:49	11:53	12:53
30	21:51	22:44	23:40	10:41	11:44	12:43
20	22:06	23:01	23:57	10:27	11:27	12:26
10	22:20	23:16	-:-	10:14	11:13	12:11
0	22:32	23:30	-:-	10:02	10:60	11:57
-10	22:45	23:43	-:-	09:51	10:46	11:43
-20	22:59	23:58	-:-	09:38	10:32	11:28
-30	23:14	-:-	00:15	09:24	10:16	11:10
-35	23:23	-:-	00:25	09:16	10:06	11:00
-40	23:34	-:-	00:36	09:06	09:56	10:49
-45	23:46	-:-	00:50	08:55	09:43	10:35
-50	-:-	00:01	01:06	08:42	09:27	10:19
-52	-:-	00:08	01:14	08:36	09:20	10:11
-54	-:-	00:16	01:22	08:29	09:12	10:03
-56	-:-	00:24	01:32	08:22	09:03	09:53
-58	-:-	00:34	01:43	08:13	08:53	09:42
-60	-:-	00:46	01:55	08:03	08:41	09:29

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
21	06:56	07:07	11:52	03:48	16:17	20(71%)
22	07:17	07:28	11:52	04:46	17:14	21(60%)
23	07:38	07:49	11:52	05:43	18:11	22(49%)

2019 Moon Phases

Date and Time (GMT/Universal Time)

New Moon	First Quarter	Full Moon	Last Quarter
January 06 01:28	January 14 06:45	January 21 05:16	January 27 21:10
February 04 21:04	February 12 22:26	February 19 15:53	February 26 11:28
March 06 16:04	March 14 10:27	March 21 01:43	March 28 04:10
April 05 08:50	April 12 19:06	April 19 11:12	April 26 22:18
May 04 22:45	May 12 01:12	May 18 21:11	May 26 16:34
June 03 10:02	June 10 05:59	June 17 08:31	June 25 09:46
July 02 19:16	July 09 10:55	July 16 21:38	July 25 01:18
August 01 03:12	August 07 17:31	August 15 12:29	August 23 14:56
August 30 10:37	September 06 03:10	September 14 04:33	September 22 02:41
September 28 18:26	October 05 16:47	October 13 21:08	October 21 12:39
October 28 03:38	November 04 10:23	November 12 13:34	November 19 21:11
November 26 15:06	December 04 06:58	December 12 05:12	December 19 04:57
December 26 05:13			

Add or subtract your time difference from Greenwich to determine local time and date of Moon phase.

2019

	1	3	5	7	9	11	13	15	17	19	21	23	25	27	29	31
Jan	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th
Feb	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We		
Mar	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su
Apr	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	
May	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr
Jun	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	
Jul	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We
Aug	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa
Sep	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	
Oct	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th
Nov	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	
Dec	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu	Th	Sa	Mo	We	Fr	Su	Tu

1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31

Conversion of Arc to Time

0° - 59°			60° - 119°			120° - 179°			180° - 239°			240° - 299°			300° - 360°			0′ - 59′			0″ - 59″	
°	**h**	**m**	**°**	**h**	**m**	**°**	**h**	**m**	**°**	**h**	**m**	**°**	**h**	**m**	**°**	**h**	**m**	**'**	**m**	**s**	**″**	**s**
0	0	00	**60**	4	00	**120**	8	00	**180**	12	00	**240**	16	00	**300**	20	00	**0**	0	00	**0**	0.00
1	0	04	**61**	4	04	**121**	8	04	**181**	12	04	**241**	16	04	**301**	20	04	**1**	0	04	**1**	0.07
2	0	08	**62**	4	08	**122**	8	08	**182**	12	08	**242**	16	08	**302**	20	08	**2**	0	08	**2**	0.13
3	0	12	**63**	4	12	**123**	8	12	**183**	12	12	**243**	16	12	**303**	20	12	**3**	0	12	**3**	0.20
4	0	16	**64**	4	16	**124**	8	16	**184**	12	16	**244**	16	16	**304**	20	16	**4**	0	16	**4**	0.27
5	0	20	**65**	4	20	**125**	8	20	**185**	12	20	**245**	16	20	**305**	20	20	**5**	0	20	**5**	0.33
6	0	24	**66**	4	24	**126**	8	24	**186**	12	24	**246**	16	24	**306**	20	24	**6**	0	24	**6**	0.40
7	0	28	**67**	4	28	**127**	8	28	**187**	12	28	**247**	16	28	**307**	20	28	**7**	0	28	**7**	0.47
8	0	32	**68**	4	32	**128**	8	32	**188**	12	32	**248**	16	32	**308**	20	32	**8**	0	32	**8**	0.53
9	0	36	**69**	4	36	**129**	8	36	**189**	12	36	**249**	16	36	**309**	20	36	**9**	0	36	**9**	0.60
10	0	40	**70**	4	40	**130**	8	40	**190**	12	40	**250**	16	40	**310**	20	40	**10**	0	40	**10**	0.67
11	0	44	**71**	4	44	**131**	8	44	**191**	12	44	**251**	16	44	**311**	20	44	**11**	0	44	**11**	0.73
12	0	48	**72**	4	48	**132**	8	48	**192**	12	48	**252**	16	48	**312**	20	48	**12**	0	48	**12**	0.80
13	0	52	**73**	4	52	**133**	8	52	**193**	12	52	**253**	16	52	**313**	20	52	**13**	0	52	**13**	0.87
14	0	56	**74**	4	56	**134**	8	56	**194**	12	56	**254**	16	56	**314**	20	56	**14**	0	56	**14**	0.93
15	1	00	**75**	5	00	**135**	9	00	**195**	13	00	**255**	17	00	**315**	21	00	**15**	1	00	**15**	1.00
16	1	04	**76**	5	04	**136**	9	04	**196**	13	04	**256**	17	04	**316**	21	04	**16**	1	04	**16**	1.07
17	1	08	**77**	5	08	**137**	9	08	**197**	13	08	**257**	17	08	**317**	21	08	**17**	1	08	**17**	1.13
18	1	12	**78**	5	12	**138**	9	12	**198**	13	12	**258**	17	12	**318**	21	12	**18**	1	12	**18**	1.20
19	1	16	**79**	5	16	**139**	9	16	**199**	13	16	**259**	17	16	**319**	21	16	**19**	1	16	**19**	1.27
20	1	20	**80**	5	20	**140**	9	20	**200**	13	20	**260**	17	20	**320**	21	20	**20**	1	20	**20**	1.33
21	1	24	**81**	5	24	**141**	9	24	**201**	13	24	**261**	17	24	**321**	21	24	**21**	1	24	**21**	1.40
22	1	28	**82**	5	28	**142**	9	28	**202**	13	28	**262**	17	28	**322**	21	28	**22**	1	28	**22**	1.47
23	1	32	**83**	5	32	**143**	9	32	**203**	13	32	**263**	17	32	**323**	21	32	**23**	1	32	**23**	1.53
24	1	36	**84**	5	36	**144**	9	36	**204**	13	36	**264**	17	36	**324**	21	36	**24**	1	36	**24**	1.60
25	1	40	**85**	5	40	**145**	9	40	**205**	13	40	**265**	17	40	**325**	21	40	**25**	1	40	**25**	1.67
26	1	44	**86**	5	44	**146**	9	44	**206**	13	44	**266**	17	44	**326**	21	44	**26**	1	44	**26**	1.73
27	1	48	**87**	5	48	**147**	9	48	**207**	13	48	**267**	17	48	**327**	21	48	**27**	1	48	**27**	1.80
28	1	52	**88**	5	52	**148**	9	52	**208**	13	52	**268**	17	52	**328**	21	52	**28**	1	52	**28**	1.87
29	1	56	**89**	5	56	**149**	9	56	**209**	13	56	**269**	17	56	**329**	21	56	**29**	1	56	**29**	1.93
30	2	00	**90**	6	00	**150**	10	00	**210**	14	00	**270**	18	00	**330**	22	00	**30**	2	00	**30**	2.00
31	2	04	**91**	6	04	**151**	10	04	**211**	14	04	**271**	18	04	**331**	22	04	**31**	2	04	**31**	2.07
32	2	08	**92**	6	08	**152**	10	08	**212**	14	08	**272**	18	08	**332**	22	08	**32**	2	08	**32**	2.13
33	2	12	**93**	6	12	**153**	10	12	**213**	14	12	**273**	18	12	**333**	22	12	**33**	2	12	**33**	2.20
34	2	16	**94**	6	16	**154**	10	16	**214**	14	16	**274**	18	16	**334**	22	16	**34**	2	16	**34**	2.27
35	2	20	**95**	6	20	**155**	10	20	**215**	14	20	**275**	18	20	**335**	22	20	**35**	2	20	**35**	2.33
36	2	24	**96**	6	24	**156**	10	24	**216**	14	24	**276**	18	24	**336**	22	24	**36**	2	24	**36**	2.40
37	2	28	**97**	6	28	**157**	10	28	**217**	14	28	**277**	18	28	**337**	22	28	**37**	2	28	**37**	2.47
38	2	32	**98**	6	32	**158**	10	32	**218**	14	32	**278**	18	32	**338**	22	32	**38**	2	32	**38**	2.53
39	2	36	**99**	6	36	**159**	10	36	**219**	14	36	**279**	18	36	**339**	22	36	**39**	2	36	**39**	2.60
40	2	40	**100**	6	40	**160**	10	40	**220**	14	40	**280**	18	40	**340**	22	40	**40**	2	40	**40**	2.67
41	2	44	**101**	6	44	**161**	10	44	**221**	14	44	**281**	18	44	**341**	22	44	**41**	2	44	**41**	2.73
42	2	48	**102**	6	48	**162**	10	48	**222**	14	48	**282**	18	48	**342**	22	48	**42**	2	48	**42**	2.80
43	2	52	**103**	6	52	**163**	10	52	**223**	14	52	**283**	18	52	**343**	22	52	**43**	2	52	**43**	2.87
44	2	56	**104**	6	56	**164**	10	56	**224**	14	56	**284**	18	56	**344**	22	56	**44**	2	56	**44**	2.93
45	3	00	**105**	7	00	**165**	11	00	**225**	15	00	**285**	19	00	**345**	23	00	**45**	3	00	**45**	3.00
46	3	04	**106**	7	04	**166**	11	04	**226**	15	04	**286**	19	04	**346**	23	04	**46**	3	04	**46**	3.07
47	3	08	**107**	7	08	**167**	11	08	**227**	15	08	**287**	19	08	**347**	23	08	**47**	3	08	**47**	3.13
48	3	12	**108**	7	12	**168**	11	12	**228**	15	12	**288**	19	12	**348**	23	12	**48**	3	12	**48**	3.20
49	3	16	**109**	7	16	**169**	11	16	**229**	15	16	**289**	19	16	**349**	23	16	**49**	3	16	**49**	3.27
50	3	20	**110**	7	20	**170**	11	20	**230**	15	20	**290**	19	20	**350**	23	20	**50**	3	20	**50**	3.33
51	3	24	**111**	7	24	**171**	11	24	**231**	15	24	**291**	19	24	**351**	23	24	**51**	3	24	**51**	3.40
52	3	28	**112**	7	28	**172**	11	28	**232**	15	28	**292**	19	28	**352**	23	28	**52**	3	28	**52**	3.47
53	3	32	**113**	7	32	**173**	11	32	**233**	15	32	**293**	19	32	**353**	23	32	**53**	3	32	**53**	3.53
54	3	36	**114**	7	36	**174**	11	36	**234**	15	36	**294**	19	36	**354**	23	36	**54**	3	36	**54**	3.60
55	3	40	**115**	7	40	**175**	11	40	**235**	15	40	**295**	19	40	**355**	23	40	**55**	3	40	**55**	3.67
56	3	44	**116**	7	44	**176**	11	44	**236**	15	44	**296**	19	44	**356**	23	44	**56**	3	44	**56**	3.73
57	3	48	**117**	7	48	**177**	11	48	**237**	15	48	**297**	19	48	**357**	23	48	**57**	3	48	**57**	3.80
58	3	52	**118**	7	52	**178**	11	52	**238**	15	52	**298**	19	52	**358**	23	52	**58**	3	52	**58**	3.87
59	3	56	**119**	7	56	**179**	11	56	**239**	15	56	**299**	19	56	**359**	23	56	**59**	3	56	**59**	3.93
60	4	00	**120**	8	00	**180**	12	00	**240**	16	00	**300**	20	00	**360**	24	00	**60**	4	00	**60**	4.00

h= hours of time **m**= minutes of time **s** = seconds of time **'** = minutes of arc **“** = seconds of arc

January 01, 02 ,03 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	100°21.4	228°21.5	-15°18.7	100°17.9	-0°18.0	210°00.8	-21°34.3	178°01.9	-22°28.0
1	115°23.9	243°21.5	-15°19.2	115°18.8	-0°17.3	225°02.7	-21°34.4	193°04.1	-22°28.0
2	130°26.3	258°21.5	-15°19.8	130°19.8	-0°16.5	240°04.6	-21°34.5	208°06.2	-22°28.0
3	145°28.8	273°21.5	-15°20.4	145°20.7	-0°15.8	255°06.5	-21°34.5	223°08.3	-22°28.0
4	160°31.3	288°21.5	-15°21.0	160°21.7	-0°15.1	270°08.4	-21°34.6	238°10.5	-22°27.9
5	175°33.7	303°21.4	-15°21.6	175°22.6	-0°14.4	285°10.3	-21°34.7	253°12.6	-22°27.9
6	190°36.2	318°21.4	-15°22.2	190°23.6	-0°13.7	300°12.2	-21°34.7	268°14.8	-22°27.9
7	205°38.7	333°21.4	-15°22.7	205°24.5	-0°12.9	315°14.1	-21°34.8	283°16.9	-22°27.9
8	220°41.1	348°21.4	-15°23.3	220°25.4	-0°12.2	330°16.0	-21°34.9	298°19.1	-22°27.8
9	235°43.6	3°21.4	-15°23.9	235°26.4	-0°11.5	345°17.9	-21°35.0	313°21.2	-22°27.8
10	250°46.0	18°21.4	-15°24.5	250°27.3	-0°10.8	0°19.9	-21°35.0	328°23.4	-22°27.8
11	265°48.5	33°21.4	-15°25.1	265°28.3	-0°10.1	15°21.8	-21°35.1	343°25.5	-22°27.8
12	280°51.0	48°21.4	-15°25.6	280°29.2	-0°09.3	30°23.7	-21°35.2	358°27.6	-22°27.8
13	295°53.4	63°21.4	-15°26.2	295°30.2	-0°08.6	45°25.6	-21°35.2	13°29.8	-22°27.7
14	310°55.9	78°21.3	-15°26.8	310°31.1	-0°07.9	60°27.5	-21°35.3	28°31.9	-22°27.7
15	325°58.4	93°21.3	-15°27.4	325°32.1	-0°07.2	75°29.4	-21°35.4	43°34.1	-22°27.7
16	341°00.8	108°21.3	-15°28.0	340°33.0	-0°06.4	90°31.3	-21°35.5	58°36.2	-22°27.7
17	356°03.3	123°21.3	-15°28.5	355°34.0	-0°05.7	105°33.2	-21°35.5	73°38.4	-22°27.6
18	11°05.8	138°21.3	-15°29.1	10°34.9	-0°05.0	120°35.1	-21°35.6	88°40.5	-22°27.6
19	26°08.2	153°21.2	-15°29.7	25°35.8	-0°04.3	135°37.0	-21°35.7	103°42.7	-22°27.6
20	41°10.7	168°21.2	-15°30.3	40°36.8	-0°03.6	150°38.9	-21°35.7	118°44.8	-22°27.6
21	56°13.1	183°21.2	-15°30.9	55°37.7	-0°02.8	165°40.8	-21°35.8	133°47.0	-22°27.6
22	71°15.6	198°21.2	-15°31.5	70°38.7	-0°02.1	180°42.7	-21°35.9	148°49.1	-22°27.5
23	86°18.1	213°21.2	-15°32.0	85°39.6	-0°01.4	195°44.6	-21°36.0	163°51.2	-22°27.5
Mer.pass.:17:15		v-0.0 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	101°20.5	228°21.1	-15°32.6	100°40.6	-0°00.7	210°46.5	-21°36.0	178°53.4	-22°27.5
1	116°23.0	243°21.1	-15°33.2	115°41.5	0°00.0	225°48.4	-21°36.1	193°55.5	-22°27.5
2	131°25.5	258°21.1	-15°33.8	130°42.5	0°00.8	240°50.4	-21°36.2	208°57.7	-22°27.4
3	146°27.9	273°21.0	-15°34.4	145°43.4	0°01.5	255°52.3	-21°36.2	223°59.8	-22°27.4
4	161°30.4	288°21.0	-15°34.9	160°44.3	0°02.2	270°54.2	-21°36.3	239°02.0	-22°27.4
5	176°32.9	303°21.0	-15°35.5	175°45.3	0°02.9	285°56.1	-21°36.4	254°04.1	-22°27.4
6	191°35.3	318°21.0	-15°36.1	190°46.2	0°03.6	300°58.0	-21°36.4	269°06.3	-22°27.3
7	206°37.8	333°20.9	-15°36.7	205°47.2	0°04.4	315°59.9	-21°36.5	284°08.4	-22°27.3
8	221°40.3	348°20.9	-15°37.3	220°48.1	0°05.1	331°01.8	-21°36.6	299°10.6	-22°27.3
9	236°42.7	3°20.9	-15°37.8	235°49.1	0°05.8	346°03.7	-21°36.7	314°12.7	-22°27.3
10	251°45.2	18°20.8	-15°38.4	250°50.0	0°06.5	1°05.6	-21°36.7	329°14.8	-22°27.3
11	266°47.6	33°20.8	-15°39.0	265°51.0	0°07.2	16°07.5	-21°36.8	344°17.0	-22°27.2
12	281°50.1	48°20.7	-15°39.6	280°51.9	0°08.0	31°09.4	-21°36.9	359°19.1	-22°27.2
13	296°52.6	63°20.7	-15°40.2	295°52.8	0°08.7	46°11.3	-21°36.9	14°21.3	-22°27.2
14	311°55.0	78°20.7	-15°40.7	310°53.8	0°09.4	61°13.2	-21°37.0	29°23.4	-22°27.2
15	326°57.5	93°20.6	-15°41.3	325°54.7	0°10.1	76°15.1	-21°37.1	44°25.6	-22°27.1
16	341°60.0	108°20.6	-15°41.9	340°55.7	0°10.8	91°17.1	-21°37.1	59°27.7	-22°27.1
17	357°02.4	123°20.5	-15°42.5	355°56.6	0°11.6	106°19.0	-21°37.2	74°29.9	-22°27.1
18	12°04.9	138°20.5	-15°43.1	10°57.6	0°12.3	121°20.9	-21°37.3	89°32.0	-22°27.1
19	27°07.4	153°20.5	-15°43.6	25°58.5	0°13.0	136°22.8	-21°37.4	104°34.2	-22°27.1
20	42°09.8	168°20.4	-15°44.2	40°59.4	0°13.7	151°24.7	-21°37.4	119°36.3	-22°27.0
21	57°12.3	183°20.4	-15°44.8	56°00.4	0°14.4	166°26.6	-21°37.5	134°38.4	-22°27.0
22	72°14.8	198°20.3	-15°45.4	71°01.3	0°15.2	181°28.5	-21°37.6	149°40.6	-22°27.0
23	87°17.2	213°20.3	-15°45.9	86°02.3	0°15.9	196°30.4	-21°37.6	164°42.7	-22°27.0
Mer.pass.:17:11		v-0.0 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	102°19.7	228°20.2	-15°46.5	101°03.2	0°16.6	211°32.3	-21°37.7	179°44.9	-22°26.9
1	117°22.1	243°20.2	-15°47.1	116°04.2	0°17.3	226°34.2	-21°37.8	194°47.0	-22°26.9
2	132°24.6	258°20.1	-15°47.7	131°05.1	0°18.0	241°36.1	-21°37.8	209°49.2	-22°26.9
3	147°27.1	273°20.1	-15°48.3	146°06.0	0°18.8	256°38.0	-21°37.9	224°51.3	-22°26.9
4	162°29.5	288°20.0	-15°48.8	161°07.0	0°19.5	271°40.0	-21°38.0	239°53.5	-22°26.9
5	177°32.0	303°20.0	-15°49.4	176°07.9	0°20.2	286°41.9	-21°38.0	254°55.6	-22°26.8
6	192°34.5	318°19.9	-15°50.0	191°08.9	0°20.9	301°43.8	-21°38.1	269°57.8	-22°26.8
7	207°36.9	333°19.8	-15°50.6	206°09.8	0°21.6	316°45.7	-21°38.2	284°59.9	-22°26.8
8	222°39.4	348°19.8	-15°51.1	221°10.8	0°22.4	331°47.6	-21°38.3	300°02.0	-22°26.8
9	237°41.9	3°19.7	-15°51.7	236°11.7	0°23.1	346°49.5	-21°38.3	315°04.2	-22°26.7
10	252°44.3	18°19.7	-15°52.3	251°12.6	0°23.8	1°51.4	-21°38.4	330°06.3	-22°26.7
11	267°46.8	33°19.6	-15°52.9	266°13.6	0°24.5	16°53.3	-21°38.5	345°08.5	-22°26.7
12	282°49.3	48°19.5	-15°53.5	281°14.5	0°25.2	31°55.2	-21°38.5	0°10.6	-22°26.7
13	297°51.7	63°19.5	-15°54.0	296°15.5	0°26.0	46°57.1	-21°38.6	15°12.8	-22°26.6
14	312°54.2	78°19.4	-15°54.6	311°16.4	0°26.7	61°59.0	-21°38.7	30°14.9	-22°26.6
15	327°56.6	93°19.4	-15°55.2	326°17.4	0°27.4	77°01.0	-21°38.7	45°17.1	-22°26.6
16	342°59.1	108°19.3	-15°55.8	341°18.3	0°28.1	92°02.9	-21°38.8	60°19.2	-22°26.6
17	358°01.6	123°19.2	-15°56.3	356°19.2	0°28.8	107°04.8	-21°38.9	75°21.3	-22°26.6
18	13°04.0	138°19.2	-15°56.9	11°20.2	0°29.6	122°06.7	-21°38.9	90°23.5	-22°26.5
19	28°06.5	153°19.1	-15°57.5	26°21.1	0°30.3	137°08.6	-21°39.0	105°25.6	-22°26.5
20	43°09.0	168°19.0	-15°58.1	41°22.1	0°31.0	152°10.5	-21°39.1	120°27.8	-22°26.5
21	58°11.4	183°19.0	-15°58.6	56°23.0	0°31.7	167°12.4	-21°39.1	135°29.9	-22°26.5
22	73°13.9	198°18.9	-15°59.2	71°23.9	0°32.4	182°14.3	-21°39.2	150°32.1	-22°26.4
23	88°16.4	213°18.8	-15°59.8	86°24.9	0°33.2	197°16.2	-21°39.3	165°34.2	-22°26.4
Mer.pass.:17:07		v-0.1 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°39.6	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.2	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.8	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°49.8	89°20.8
Akamar	315°15.2	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.5
Sirius	258°30.0	-16°44.5
Adara	255°09.2	-29°00.0
Procyon	244°55.4	5°10.6
Pollux	243°22.7	27°58.6
Avior	234°15.9	-59°34.2
Suhail	222°49.3	-43°30.5
Miaplacidus	221°38.1	-69°47.5
Alphard	217°52.1	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°46.8	61°38.7
Denebola	182°29.7	14°27.9
Gienah	175°48.3	-17°38.7
Acrux	173°05.0	-63°11.9
Gacrux	171°56.6	-57°12.8
Alioth	166°17.5	55°51.2
Spica	158°27.3	-11°15.4
Alcaid	152°56.1	49°13.0
Hadar	148°42.7	-60°27.4
Menkent	148°03.3	-36°27.5
Arcturus	145°52.3	19°05.3
Rigil Kent.	139°46.9	-60°54.4
Zubenelg.	137°01.4	-16°07.0
Kochab	137°20.8	74°04.5
Alphecca	126°08.1	26°39.1
Antares	112°21.9	-26°28.2
Atria	107°20.9	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.3	12°32.9
Etamin	90°44.9	51°29.3
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.9	38°48.1
Nunki	75°54.0	-26°16.3
Altair	62°05.0	8°55.1
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.0
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.4

2019/1/1	SHA	Mer.pass
Venus	128°00.1	08:47
Mars	359°56.5	17:18
Jupiter	109°39.4	09:59
Saturn	77°40.5	12:06

2019/1/2	SHA	Mer.pass
Venus	127°00.6	08:47
Mars	359°20.0	17:16
Jupiter	109°26.0	09:56
Saturn	77°32.9	12:03

2019/1/3	SHA	Mer.pass
Venus	126°00.5	08:47
Mars	358°43.5	17:15
Jupiter	109°12.6	09:53
Saturn	77°25.2	11:59

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°12.0	-23°02.3	238°51.3	12.3	-10°42.3	-10.4	56.6
1	194°11.7	-23°02.1	253°22.6	12.3	-10°52.7	-10.4	56.6
2	209°11.4	-23°01.9	267°53.8	12.2	-11°03.1	-10.3	56.6
3	224°11.1	-23°01.7	282°25.0	12.2	-11°13.3	-10.3	56.6
4	239°10.8	-23°01.5	296°56.3	12.2	-11°23.6	-10.2	56.5
5	254°10.5	-23°01.3	311°27.5	12.2	-11°33.7	-10.1	56.5
6	269°10.2	-23°01.1	325°58.7	12.2	-11°43.8	-10.1	56.5
7	284°09.9	-23°00.9	340°29.9	12.2	-11°53.9	-10.0	56.5
8	299°09.6	-23°00.7	355°01.0	12.2	-12°03.8	-9.9	56.5
9	314°09.3	-23°00.5	9°32.2	12.1	-12°13.7	-9.9	56.4
10	329°09.0	-23°00.3	24°03.3	12.1	-12°23.6	-9.8	56.4
11	344°08.7	-23°00.1	38°34.4	12.1	-12°33.3	-9.7	56.4
12	359°08.4	-22°59.9	53°05.5	12.1	-12°43.1	-9.7	56.4
13	14°08.2	-22°59.7	67°36.6	12.1	-12°52.7	-9.6	56.3
14	29°07.9	-22°59.5	82°07.7	12.1	-13°02.3	-9.5	56.3
15	44°07.6	-22°59.3	96°38.7	12.0	-13°11.7	-9.5	56.3
16	59°07.3	-22°59.1	111°09.8	12.0	-13°21.2	-9.4	56.3
17	74°07.0	-22°58.9	125°40.8	12.0	-13°30.5	-9.3	56.2
18	89°06.7	-22°58.7	140°11.8	12.0	-13°39.8	-9.2	56.2
19	104°06.4	-22°58.5	154°42.8	12.0	-13°49.0	-9.2	56.2
20	119°06.1	-22°58.3	169°13.7	12.0	-13°58.2	-9.1	56.2
21	134°05.8	-22°58.0	183°44.7	11.9	-14°07.2	-9.0	56.2
22	149°05.5	-22°57.8	198°15.6	11.9	-14°16.2	-8.9	56.1
23	164°05.2	-22°57.6	212°46.5	11.9	-14°25.1	-8.9	56.1
	SD.=16.3	d=0.2			S.D.=15.5		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°04.9	-22°57.4	227°17.4	11.9	-14°33.9	-8.8	56.1
1	194°04.6	-22°57.2	241°48.2	11.9	-14°42.7	-8.7	56.1
2	209°04.3	-22°57.0	256°19.1	11.8	-14°51.4	-8.6	56.0
3	224°04.0	-22°56.7	270°49.9	11.8	-14°60.0	-8.6	56.0
4	239°03.7	-22°56.5	285°20.7	11.8	-15°08.5	-8.5	56.0
5	254°03.4	-22°56.3	299°51.5	11.8	-15°17.0	-8.4	56.0
6	269°03.1	-22°56.1	314°22.3	11.7	-15°25.3	-8.3	56.0
7	284°02.9	-22°55.9	328°53.0	11.7	-15°33.6	-8.2	55.9
8	299°02.6	-22°55.7	343°23.7	11.7	-15°41.8	-8.2	55.9
9	314°02.3	-22°55.4	357°54.4	11.7	-15°49.9	-8.1	55.9
10	329°02.0	-22°55.2	12°25.1	11.7	-15°58.0	-8.0	55.9
11	344°01.7	-22°55.0	26°55.7	11.6	-16°05.9	-7.9	55.9
12	359°01.4	-22°54.8	41°26.4	11.6	-16°13.8	-7.8	55.8
13	14°01.1	-22°54.5	55°57.0	11.6	-16°21.6	-7.7	55.8
14	29°00.8	-22°54.3	70°27.6	11.6	-16°29.3	-7.7	55.8
15	44°00.5	-22°54.1	84°58.1	11.6	-16°36.9	-7.6	55.8
16	59°00.2	-22°53.9	99°28.7	11.5	-16°44.5	-7.5	55.8
17	73°59.9	-22°53.6	113°59.2	11.5	-16°51.9	-7.4	55.7
18	88°59.6	-22°53.4	128°29.7	11.5	-16°59.3	-7.3	55.7
19	103°59.3	-22°53.2	143°00.2	11.5	-17°06.5	-7.2	55.7
20	118°59.1	-22°52.9	157°30.6	11.4	-17°13.7	-7.1	55.7
21	133°58.8	-22°52.7	172°01.1	11.4	-17°20.8	-7.1	55.7
22	148°58.5	-22°52.5	186°31.5	11.4	-17°27.8	-7.0	55.6
23	163°58.2	-22°52.2	201°01.9	11.4	-17°34.8	-6.9	55.6
	SD.=16.3	d=0.2			S.D.=15.3		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°57.9	-22°52.0	215°32.3	11.4	-17°41.6	-6.8	55.6
1	193°57.6	-22°51.8	230°02.6	11.3	-17°48.3	-6.7	55.6
2	208°57.3	-22°51.5	244°33.0	11.3	-17°55.0	-6.6	55.6
3	223°57.0	-22°51.3	259°03.3	11.3	-18°01.5	-6.5	55.5
4	238°56.7	-22°51.1	273°33.6	11.3	-18°08.0	-6.4	55.5
5	253°56.4	-22°50.8	288°03.8	11.3	-18°14.3	-6.3	55.5
6	268°56.1	-22°50.6	302°34.1	11.2	-18°20.6	-6.2	55.5
7	283°55.9	-22°50.3	317°04.3	11.2	-18°26.8	-6.1	55.5
8	298°55.6	-22°50.1	331°34.5	11.2	-18°32.9	-6.0	55.4
9	313°55.3	-22°49.9	346°04.7	11.2	-18°38.9	-5.9	55.4
10	328°55.0	-22°49.6	0°34.9	11.2	-18°44.8	-5.8	55.4
11	343°54.7	-22°49.4	15°05.1	11.1	-18°50.6	-5.8	55.4
12	358°54.4	-22°49.1	29°35.2	11.1	-18°56.3	-5.7	55.4
13	13°54.1	-22°48.9	44°05.3	11.1	-19°01.9	-5.6	55.4
14	28°53.8	-22°48.6	58°35.4	11.1	-19°07.4	-5.5	55.3
15	43°53.5	-22°48.4	73°05.5	11.1	-19°12.8	-5.4	55.3
16	58°53.3	-22°48.2	87°35.6	11.1	-19°18.1	-5.3	55.3
17	73°53.0	-22°47.9	102°05.6	11.0	-19°23.3	-5.2	55.3
18	88°52.7	-22°47.7	116°35.7	11.0	-19°28.5	-5.1	55.3
19	103°52.4	-22°47.4	131°05.7	11.0	-19°33.5	-5.0	55.2
20	118°52.1	-22°47.2	145°35.7	11.0	-19°38.4	-4.9	55.2
21	133°51.8	-22°46.9	160°05.7	11.0	-19°43.2	-4.8	55.2
22	148°51.5	-22°46.7	174°35.7	11.0	-19°47.9	-4.7	55.2
23	163°51.2	-22°46.4	189°05.6	11.0	-19°52.6	-4.6	55.2
	SD.=16.3	d=0.2			S.D.=15.2		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:23	10:40	–:–	–:–	13:28	15:45
70	08:04	09:48	–:–	–:–	14:20	16:04
68	07:49	09:16	–:–	–:–	14:52	16:19
66	07:37	08:52	10:26	13:42	15:16	16:31
64	07:26	08:34	09:49	14:19	15:34	16:42
62	07:17	08:18	09:22	14:46	15:50	16:51
60	07:09	08:05	09:02	15:06	16:03	16:59
58	07:02	07:54	08:45	15:23	16:14	17:06
56	06:55	07:44	08:31	15:37	16:24	17:13
54	06:50	07:35	08:19	15:49	16:33	17:18
52	06:44	07:28	08:08	16:00	16:41	17:24
50	06:39	07:20	07:58	16:10	16:48	17:29
45	06:28	07:05	07:38	16:30	17:03	17:40
40	06:18	06:52	07:22	16:46	17:16	17:50
35	06:09	06:40	07:08	16:60	17:28	17:59
30	06:00	06:30	06:56	17:12	17:38	18:08
20	05:44	06:11	06:35	17:33	17:56	18:24
10	05:28	05:54	06:17	17:51	18:13	18:40
0	05:12	05:38	06:00	18:08	18:30	18:56
-10	04:53	05:20	05:43	18:25	18:48	19:15
-20	04:31	04:60	05:24	18:43	19:08	19:37
-30	04:02	04:36	05:03	19:05	19:32	20:05
-35	03:44	04:21	04:50	19:17	19:47	20:23
-40	03:22	04:03	04:35	19:32	20:05	20:46
-45	02:52	03:41	04:18	19:50	20:27	21:15
-50	02:08	03:12	03:56	20:11	20:55	21:59
-52	01:42	02:57	03:45	20:22	21:10	22:24
-54	01:03	02:40	03:34	20:34	21:27	23:03
-56	–:–	02:19	03:20	20:47	21:48	–:–
-58	–:–	01:51	03:04	21:03	22:15	–:–
-60	–:–	01:08	02:44	21:23	22:57	–:–

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	04:52	07:04	–:–	11:30	10:59	–:–
70	04:31	06:23	08:28	11:53	11:40	11:17
68	04:14	05:56	07:39	12:10	12:08	12:07
66	04:01	05:36	07:08	12:25	12:30	12:39
64	03:50	05:19	06:45	12:36	12:47	13:02
62	03:41	05:06	06:27	12:46	13:01	13:21
60	03:34	04:54	06:12	12:55	13:13	13:36
58	03:27	04:44	05:59	13:03	13:24	13:50
56	03:21	04:36	05:48	13:10	13:33	14:01
54	03:15	04:28	05:38	13:16	13:41	14:11
52	03:10	04:21	05:30	13:21	13:48	14:20
50	03:06	04:15	05:22	13:26	13:55	14:28
45	02:57	04:02	05:06	13:37	14:09	14:45
40	02:49	03:51	04:52	13:46	14:21	14:59
35	02:42	03:42	04:41	13:53	14:31	15:11
30	02:36	03:34	04:31	14:00	14:39	15:21
20	02:26	03:20	04:14	14:12	14:55	15:39
10	02:17	03:08	03:59	14:22	15:08	15:55
0	02:09	02:57	03:46	14:32	15:20	16:10
-10	02:01	02:46	03:32	14:42	15:33	16:24
-20	01:52	02:34	03:18	14:52	15:46	16:40
-30	01:43	02:21	03:01	15:04	16:02	16:58
-35	01:37	02:13	02:51	15:11	16:11	17:08
-40	01:31	02:04	02:40	15:19	16:21	17:21
-45	01:23	01:54	02:28	15:28	16:33	17:35
-50	01:15	01:41	02:12	15:39	16:47	17:52
-52	01:11	01:36	02:05	15:45	16:54	18:01
-54	01:06	01:29	01:57	15:50	17:02	18:10
-56	01:01	01:22	01:48	15:57	17:10	18:20
-58	00:56	01:15	01:38	16:04	17:20	18:32
-60	00:50	01:06	01:26	16:12	17:31	18:46

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	03:12	03:26	12:03	08:20	20:44	25(19%)
2	03:40	03:55	12:03	09:08	21:33	26(12%)
3	04:09	04:22	12:04	09:57	22:22	27(6%)

January 04, 05 ,06 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	103°18.8	228°18.7	-16°00.4	101°25.8	0°33.9	212°18.2	-21°39.4	180°36.4	-22°26.4
1	118°21.3	243°18.7	-16°00.9	116°26.8	0°34.6	227°20.1	-21°39.4	195°38.5	-22°26.4
2	133°23.7	258°18.6	-16°01.5	131°27.7	0°35.3	242°22.0	-21°39.5	210°40.7	-22°26.3
3	148°26.2	273°18.5	-16°02.1	146°28.7	0°36.0	257°23.9	-21°39.6	225°42.8	-22°26.3
4	163°28.7	288°18.4	-16°02.7	161°29.6	0°36.8	272°25.8	-21°39.6	240°44.9	-22°26.3
5	178°31.1	303°18.4	-16°03.2	176°30.5	0°37.5	287°27.7	-21°39.7	255°47.1	-22°26.3
6	193°33.6	318°18.3	-16°03.8	191°31.5	0°38.2	302°29.6	-21°39.8	270°49.2	-22°26.3
7	208°36.1	333°18.2	-16°04.4	206°32.4	0°38.9	317°31.5	-21°39.8	285°51.4	-22°26.2
8	223°38.5	348°18.1	-16°05.0	221°33.4	0°39.6	332°33.4	-21°39.9	300°53.5	-22°26.2
9	238°41.0	3°18.0	-16°05.5	236°34.3	0°40.3	347°35.4	-21°40.0	315°55.7	-22°26.2
10	253°43.5	18°18.0	-16°06.1	251°35.2	0°41.1	2°37.3	-21°40.0	330°57.8	-22°26.2
11	268°45.9	33°17.9	-16°06.7	266°36.2	0°41.8	17°39.2	-21°40.1	345°60.0	-22°26.1
12	283°48.4	48°17.8	-16°07.3	281°37.1	0°42.5	32°41.1	-21°40.2	1°02.1	-22°26.1
13	298°50.9	63°17.7	-16°07.8	296°38.1	0°43.2	47°43.0	-21°40.2	16°04.3	-22°26.1
14	313°53.3	78°17.6	-16°08.4	311°39.0	0°43.9	62°44.9	-21°40.3	31°06.4	-22°26.1
15	328°55.8	93°17.5	-16°09.0	326°39.9	0°44.7	77°46.8	-21°40.4	46°08.5	-22°26.0
16	343°58.2	108°17.4	-16°09.5	341°40.9	0°45.4	92°48.7	-21°40.4	61°10.7	-22°26.0
17	359°00.7	123°17.4	-16°10.1	356°41.8	0°46.1	107°50.6	-21°40.5	76°12.8	-22°26.0
18	14°03.2	138°17.3	-16°10.7	11°42.8	0°46.8	122°52.6	-21°40.6	91°15.0	-22°26.0
19	29°05.6	153°17.2	-16°11.3	26°43.7	0°47.5	137°54.5	-21°40.6	106°17.1	-22°26.0
20	44°08.1	168°17.1	-16°11.8	41°44.6	0°48.3	152°56.4	-21°40.7	121°19.3	-22°25.9
21	59°10.6	183°17.0	-16°12.4	56°45.6	0°49.0	167°58.3	-21°40.8	136°21.4	-22°25.9
22	74°13.0	198°16.9	-16°13.0	71°46.5	0°49.7	183°00.2	-21°40.8	151°23.6	-22°25.9
23	89°15.5	213°16.8	-16°13.6	86°47.5	0°50.4	198°02.1	-21°40.9	166°25.7	-22°25.9
Mer.pass.:17:03		v-0.1 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	104°18.0	228°16.7	-16°14.1	101°48.4	0°51.1	213°04.0	-21°41.0	181°27.9	-22°25.8
1	119°20.4	243°16.6	-16°14.7	116°49.3	0°51.9	228°05.9	-21°41.0	196°30.0	-22°25.8
2	134°22.9	258°16.5	-16°15.3	131°50.3	0°52.6	243°07.9	-21°41.1	211°32.1	-22°25.8
3	149°25.4	273°16.4	-16°15.8	146°51.2	0°53.3	258°09.8	-21°41.2	226°34.3	-22°25.8
4	164°27.8	288°16.3	-16°16.4	161°52.2	0°54.0	273°11.7	-21°41.2	241°36.4	-22°25.7
5	179°30.3	303°16.2	-16°17.0	176°53.1	0°54.7	288°13.6	-21°41.3	256°38.6	-22°25.7
6	194°32.7	318°16.1	-16°17.5	191°54.0	0°55.5	303°15.5	-21°41.4	271°40.7	-22°25.7
7	209°35.2	333°16.0	-16°18.1	206°55.0	0°56.2	318°17.4	-21°41.4	286°42.9	-22°25.7
8	224°37.7	348°15.9	-16°18.7	221°55.9	0°56.9	333°19.3	-21°41.5	301°45.0	-22°25.7
9	239°40.1	3°15.8	-16°19.3	236°56.9	0°57.6	348°21.3	-21°41.6	316°47.2	-22°25.6
10	254°42.6	18°15.7	-16°19.8	251°57.8	0°58.3	3°23.2	-21°41.6	331°49.3	-22°25.6
11	269°45.1	33°15.6	-16°20.4	266°58.7	0°59.1	18°25.1	-21°41.7	346°51.5	-22°25.6
12	284°47.5	48°15.5	-16°21.0	281°59.7	0°59.8	33°27.0	-21°41.8	1°53.6	-22°25.6
13	299°50.0	63°15.4	-16°21.5	297°00.6	1°00.5	48°28.9	-21°41.8	16°55.7	-22°25.5
14	314°52.5	78°15.3	-16°22.1	312°01.6	1°01.2	63°30.8	-21°41.9	31°57.9	-22°25.5
15	329°54.9	93°15.2	-16°22.7	327°02.5	1°01.9	78°32.7	-21°42.0	47°00.0	-22°25.5
16	344°57.4	108°15.1	-16°23.2	342°03.4	1°02.6	93°34.7	-21°42.0	62°02.2	-22°25.5
17	359°59.9	123°14.9	-16°23.8	357°04.4	1°03.4	108°36.6	-21°42.1	77°04.3	-22°25.4
18	15°02.3	138°14.8	-16°24.4	12°05.3	1°04.1	123°38.5	-21°42.2	92°06.5	-22°25.4
19	30°04.8	153°14.7	-16°24.9	27°06.3	1°04.8	138°40.4	-21°42.2	107°08.6	-22°25.4
20	45°07.2	168°14.6	-16°25.5	42°07.2	1°05.5	153°42.3	-21°42.3	122°10.8	-22°25.4
21	60°09.7	183°14.5	-16°26.1	57°08.1	1°06.2	168°44.2	-21°42.4	137°12.9	-22°25.3
22	75°12.2	198°14.4	-16°26.6	72°09.1	1°07.0	183°46.1	-21°42.4	152°15.1	-22°25.3
23	90°14.6	213°14.3	-16°27.2	87°10.0	1°07.7	198°48.1	-21°42.5	167°17.2	-22°25.3
Mer.pass.:17:00		v-0.1 d-0.6 m-4.3		v0.9 d0.7 m0.5		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	105°17.1	228°14.1	-16°27.8	102°10.9	1°08.4	213°50.0	-21°42.6	182°19.4	-22°25.3
1	120°19.6	243°14.0	-16°28.3	117°11.9	1°09.1	228°51.9	-21°42.6	197°21.5	-22°25.3
2	135°22.0	258°13.9	-16°28.9	132°12.8	1°09.8	243°53.8	-21°42.7	212°23.6	-22°25.2
3	150°24.5	273°13.8	-16°29.5	147°13.8	1°10.6	258°55.7	-21°42.8	227°25.8	-22°25.2
4	165°27.0	288°13.7	-16°30.0	162°14.7	1°11.3	273°57.6	-21°42.8	242°27.9	-22°25.2
5	180°29.4	303°13.5	-16°30.6	177°15.6	1°12.0	288°59.5	-21°42.9	257°30.1	-22°25.2
6	195°31.9	318°13.4	-16°31.2	192°16.6	1°12.7	304°01.5	-21°43.0	272°32.2	-22°25.1
7	210°34.4	333°13.3	-16°31.7	207°17.5	1°13.4	319°03.4	-21°43.0	287°34.4	-22°25.1
8	225°36.8	348°13.2	-16°32.3	222°18.4	1°14.1	334°05.3	-21°43.1	302°36.5	-22°25.1
9	240°39.3	3°13.0	-16°32.9	237°19.4	1°14.9	349°07.2	-21°43.2	317°38.7	-22°25.1
10	255°41.7	18°12.9	-16°33.4	252°20.3	1°15.6	4°09.1	-21°43.2	332°40.8	-22°25.0
11	270°44.2	33°12.8	-16°34.0	267°21.3	1°16.3	19°11.0	-21°43.3	347°43.0	-22°25.0
12	285°46.7	48°12.7	-16°34.5	282°22.2	1°17.0	34°13.0	-21°43.4	2°45.1	-22°25.0
13	300°49.1	63°12.5	-16°35.1	297°23.1	1°17.7	49°14.9	-21°43.4	17°47.2	-22°25.0
14	315°51.6	78°12.4	-16°35.7	312°24.1	1°18.5	64°16.8	-21°43.5	32°49.4	-22°24.9
15	330°54.1	93°12.3	-16°36.2	327°25.0	1°19.2	79°18.7	-21°43.6	47°51.5	-22°24.9
16	345°56.5	108°12.1	-16°36.8	342°25.9	1°19.9	94°20.6	-21°43.6	62°53.7	-22°24.9
17	0°59.0	123°12.0	-16°37.4	357°26.9	1°20.6	109°22.5	-21°43.7	77°55.8	-22°24.9
18	16°01.5	138°11.9	-16°37.9	12°27.8	1°21.3	124°24.5	-21°43.8	92°58.0	-22°24.9
19	31°03.9	153°11.7	-16°38.5	27°28.8	1°22.0	139°26.4	-21°43.8	108°00.1	-22°24.8
20	46°06.4	168°11.6	-16°39.0	42°29.7	1°22.8	154°28.3	-21°43.9	123°02.3	-22°24.8
21	61°08.8	183°11.5	-16°39.6	57°30.6	1°23.5	169°30.2	-21°44.0	138°04.4	-22°24.8
22	76°11.3	198°11.3	-16°40.2	72°31.6	1°24.2	184°32.1	-21°44.0	153°06.6	-22°24.8
23	91°13.8	213°11.2	-16°40.7	87°32.5	1°24.9	199°34.0	-21°44.1	168°08.7	-22°24.7
Mer.pass.:16:56		v-0.1 d-0.6 m-4.3		v0.9 d0.7 m0.6		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars		
	SHA	**Dec**
Alpheratz	357°39.7	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.2	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.9	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°50.7	89°20.8
Akamar	315°15.2	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.5
Sirius	258°29.9	-16°44.5
Adara	255°09.2	-29°00.0
Procyon	244°55.4	5°10.6
Pollux	243°22.7	27°58.6
Avior	234°15.9	-59°34.2
Suhail	222°49.3	-43°30.5
Miaplacidus	221°38.1	-69°47.5
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°46.8	61°38.7
Denebola	182°29.7	14°27.9
Gienah	175°48.3	-17°38.7
Acrux	173°05.0	-63°11.9
Gacrux	171°56.6	-57°12.8
Alioth	166°17.4	55°51.2
Spica	158°27.3	-11°15.4
Alcaid	152°56.0	49°13.0
Hadar	148°42.7	-60°27.4
Menkent	148°03.2	-36°27.5
Arcturus	145°52.3	19°05.3
Rigil Kent.	139°46.9	-60°54.4
Zubenelg.	137°01.4	-16°07.0
Kochab	137°20.8	74°04.5
Alphecca	126°08.1	26°39.1
Antares	112°21.9	-26°28.2
Atria	107°20.8	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.3	12°32.9
Etamin	90°44.9	51°29.2
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.9	38°48.1
Nunki	75°54.0	-26°16.3
Altair	62°05.0	8°55.1
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.0
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.4

2019/1/4	**SHA**	**Mer.pass**
Venus	124°59.9	08:47
Mars	358°07.0	17:13
Jupiter	108°59.3	09:50
Saturn	77°17.5	11:56

2019/1/5	**SHA**	**Mer.pass**
Venus	123°58.8	08:47
Mars	357°30.4	17:12
Jupiter	108°46.1	09:46
Saturn	77°09.9	11:52

2019/1/6	**SHA**	**Mer.pass**
Venus	122°57.0	08:47
Mars	356°53.8	17:10
Jupiter	108°32.9	09:43
Saturn	77°02.2	11:49

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°51.0	-22°46.2	203°35.6	10.9	-19°57.1	-4.5	55.2
1	193°50.7	-22°45.9	218°05.5	10.9	-20°01.5	-4.4	55.1
2	208°50.4	-22°45.6	232°35.5	10.9	-20°05.8	-4.3	55.1
3	223°50.1	-22°45.4	247°05.4	10.9	-20°10.0	-4.2	55.1
4	238°49.8	-22°45.1	261°35.3	10.9	-20°14.2	-4.1	55.1
5	253°49.5	-22°44.9	276°05.2	10.9	-20°18.2	-4.0	55.1
6	268°49.2	-22°44.6	290°35.0	10.9	-20°22.1	-3.9	55.1
7	283°49.0	-22°44.4	305°04.9	10.9	-20°25.9	-3.8	55.0
8	298°48.7	-22°44.1	319°34.8	10.9	-20°29.6	-3.7	55.0
9	313°48.4	-22°43.8	334°04.6	10.8	-20°33.2	-3.5	55.0
10	328°48.1	-22°43.6	348°34.5	10.8	-20°36.7	-3.4	55.0
11	343°47.8	-22°43.3	3°04.3	10.8	-20°40.1	-3.3	55.0
12	358°47.5	-22°43.1	17°34.1	10.8	-20°43.4	-3.2	55.0
13	13°47.2	-22°42.8	32°03.9	10.8	-20°46.6	-3.1	55.0
14	28°47.0	-22°42.5	46°33.8	10.8	-20°49.6	-3.0	54.9
15	43°46.7	-22°42.3	61°03.6	10.8	-20°52.6	-2.9	54.9
16	58°46.4	-22°42.0	75°33.4	10.8	-20°55.5	-2.8	54.9
17	73°46.1	-22°41.7	90°03.2	10.8	-20°58.3	-2.7	54.9
18	88°45.8	-22°41.5	104°33.0	10.8	-21°00.9	-2.6	54.9
19	103°45.5	-22°41.2	119°02.8	10.8	-21°03.5	-2.5	54.9
20	118°45.3	-22°40.9	133°32.6	10.8	-21°05.9	-2.4	54.8
21	133°45.0	-22°40.7	148°02.4	10.8	-21°08.3	-2.3	54.8
22	148°44.7	-22°40.4	162°32.1	10.8	-21°10.5	-2.2	54.8
23	163°44.4	-22°40.1	177°01.9	10.8	-21°12.7	-2.1	54.8
	SD.=16.3	d=0.3			S.D.=15.0		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°44.1	-22°39.9	191°31.7	10.8	-21°14.7	-2.0	54.8
1	193°43.8	-22°39.6	206°01.5	10.8	-21°16.6	-1.9	54.8
2	208°43.6	-22°39.3	220°31.3	10.8	-21°18.4	-1.8	54.8
3	223°43.3	-22°39.0	235°01.1	10.8	-21°20.1	-1.7	54.7
4	238°43.0	-22°38.8	249°30.9	10.8	-21°21.7	-1.6	54.7
5	253°42.7	-22°38.5	264°00.7	10.8	-21°23.2	-1.4	54.7
6	268°42.4	-22°38.2	278°30.5	10.8	-21°24.6	-1.3	54.7
7	283°42.1	-22°37.9	293°00.3	10.8	-21°25.9	-1.2	54.7
8	298°41.9	-22°37.7	307°30.2	10.8	-21°27.1	-1.1	54.7
9	313°41.6	-22°37.4	321°60.0	10.8	-21°28.2	-1.0	54.7
10	328°41.3	-22°37.1	336°29.8	10.8	-21°29.2	-0.9	54.7
11	343°41.0	-22°36.8	350°59.7	10.8	-21°30.0	-0.8	54.6
12	358°40.7	-22°36.5	5°29.5	10.9	-21°30.8	-0.7	54.6
13	13°40.5	-22°36.3	19°59.4	10.9	-21°31.4	-0.6	54.6
14	28°40.2	-22°36.0	34°29.3	10.9	-21°32.0	-0.5	54.6
15	43°39.9	-22°35.7	48°59.1	10.9	-21°32.4	-0.4	54.6
16	58°39.6	-22°35.4	63°29.0	10.9	-21°32.8	-0.3	54.6
17	73°39.3	-22°35.1	77°58.9	10.9	-21°33.0	-0.2	54.6
18	88°39.1	-22°34.8	92°28.9	10.9	-21°33.1	-0.1	54.6
19	103°38.8	-22°34.5	106°58.8	10.9	-21°33.2	0.0	54.5
20	118°38.5	-22°34.3	121°28.7	11.0	-21°33.1	0.1	54.5
21	133°38.2	-22°34.0	135°58.7	11.0	-21°32.9	0.2	54.5
22	148°38.0	-22°33.7	150°28.7	11.0	-21°32.6	0.3	54.5
23	163°37.7	-22°33.4	164°58.7	11.0	-21°32.2	0.4	54.5
	SD.=16.3	d=0.3			S.D.=14.9		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°37.4	-22°33.1	179°28.7	11.0	-21°31.7	0.6	54.5
1	193°37.1	-22°32.8	193°58.7	11.0	-21°31.1	0.7	54.5
2	208°36.8	-22°32.5	208°28.8	11.1	-21°30.4	0.8	54.5
3	223°36.6	-22°32.2	222°58.8	11.1	-21°29.6	0.9	54.4
4	238°36.3	-22°31.9	237°28.9	11.1	-21°28.6	1.0	54.4
5	253°36.0	-22°31.6	251°59.0	11.1	-21°27.6	1.1	54.4
6	268°35.7	-22°31.3	266°29.2	11.1	-21°26.5	1.2	54.4
7	283°35.5	-22°31.0	280°59.3	11.2	-21°25.3	1.3	54.4
8	298°35.2	-22°30.8	295°29.5	11.2	-21°23.9	1.4	54.4
9	313°34.9	-22°30.5	309°59.7	11.2	-21°22.5	1.5	54.4
10	328°34.6	-22°30.2	324°29.9	11.2	-21°21.0	1.6	54.4
11	343°34.3	-22°29.9	339°00.2	11.3	-21°19.3	1.7	54.4
12	358°34.1	-22°29.6	353°30.4	11.3	-21°17.6	1.8	54.3
13	13°33.8	-22°29.3	8°00.7	11.3	-21°15.8	1.9	54.3
14	28°33.5	-22°29.0	22°31.1	11.3	-21°13.8	2.0	54.3
15	43°33.2	-22°28.7	37°01.4	11.4	-21°11.8	2.1	54.3
16	58°33.0	-22°28.4	51°31.8	11.4	-21°09.7	2.2	54.3
17	73°32.7	-22°28.1	66°02.2	11.4	-21°07.4	2.3	54.3
18	88°32.4	-22°27.7	80°32.6	11.4	-21°05.1	2.4	54.3
19	103°32.1	-22°27.4	95°03.1	11.5	-21°02.6	2.5	54.3
20	118°31.9	-22°27.1	109°33.6	11.5	-21°00.1	2.6	54.3
21	133°31.6	-22°26.8	124°04.1	11.5	-20°57.5	2.7	54.3
22	148°31.3	-22°26.5	138°34.7	11.6	-20°54.7	2.8	54.3
23	163°31.0	-22°26.2	153°05.3	11.6	-20°51.9	2.9	54.2
	SD.=16.3	d=0.3			S.D.=14.9		

	Twilight					Twilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:20	10:31	–:–	–:–	13:41	15:51
70	08:02	09:43	–:–	–:–	14:28	16:09
68	07:47	09:13	11:31	12:40	14:58	16:24
66	07:35	08:50	10:20	13:51	15:21	16:36
64	07:25	08:32	09:45	14:26	15:39	16:46
62	07:16	08:17	09:20	14:51	15:54	16:55
60	07:08	08:04	08:60	15:11	16:07	17:03
58	07:01	07:53	08:44	15:27	16:18	17:10
56	06:55	07:43	08:30	15:41	16:27	17:16
54	06:49	07:35	08:18	15:53	16:36	17:22
52	06:44	07:27	08:07	16:04	16:44	17:27
50	06:39	07:20	07:58	16:13	16:51	17:32
45	06:28	07:05	07:38	16:33	17:06	17:43
40	06:18	06:52	07:22	16:49	17:19	17:53
35	06:09	06:41	07:08	17:02	17:30	18:02
30	06:01	06:30	06:57	17:14	17:40	18:10
20	05:45	06:12	06:36	17:34	17:58	18:26
10	05:29	05:56	06:18	17:52	18:15	18:41
0	05:13	05:39	06:02	18:09	18:31	18:57
-10	04:55	05:22	05:45	18:26	18:49	19:16
-20	04:33	05:02	05:26	18:44	19:08	19:37
-30	04:05	04:38	05:05	19:05	19:32	20:05
-35	03:47	04:23	04:53	19:18	19:47	20:23
-40	03:25	04:06	04:38	19:32	20:05	20:45
-45	02:56	03:44	04:21	19:49	20:26	21:14
-50	02:13	03:16	03:59	20:11	20:54	21:56
-52	01:48	03:02	03:49	20:21	21:08	22:21
-54	01:12	02:45	03:37	20:33	21:25	22:56
-56	–:–	02:24	03:24	20:46	21:45	–:–
-58	–:–	01:58	03:08	21:02	22:11	–:–
-60	–:–	01:18	02:49	21:20	22:50	–:–

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	09:21	10:49	11:29	12:09	12:24	13:28
66	08:34	09:44	10:30	12:56	13:29	14:26
64	08:03	09:09	09:56	13:27	14:05	14:60
62	07:41	08:43	09:32	13:50	14:30	15:24
60	07:22	08:24	09:12	14:08	14:50	15:44
58	07:07	08:07	08:56	14:23	15:07	15:60
56	06:54	07:53	08:42	14:36	15:21	16:13
54	06:43	07:41	08:30	14:48	15:33	16:25
52	06:33	07:30	08:20	14:58	15:43	16:36
50	06:24	07:21	08:10	15:07	15:53	16:45
45	06:06	07:01	07:51	15:26	16:13	17:05
40	05:50	06:45	07:35	15:42	16:29	17:20
35	05:38	06:31	07:21	15:55	16:43	17:34
30	05:26	06:19	07:09	16:06	16:55	17:45
20	05:07	05:59	06:49	16:26	17:15	18:05
10	04:51	05:42	06:31	16:43	17:33	18:23
0	04:35	05:25	06:15	16:59	17:49	18:39
-10	04:20	05:09	05:59	17:15	18:06	18:55
-20	04:03	04:51	05:41	17:33	18:23	19:12
-30	03:45	04:31	05:21	17:52	18:44	19:32
-35	03:34	04:20	05:09	18:04	18:56	19:43
-40	03:21	04:06	04:55	18:17	19:09	19:56
-45	03:06	03:50	04:39	18:33	19:25	20:12
-50	02:48	03:31	04:20	18:52	19:45	20:31
-52	02:40	03:21	04:10	19:01	19:55	20:40
-54	02:30	03:11	03:60	19:11	20:05	20:50
-56	02:20	02:59	03:48	19:23	20:17	21:01
-58	02:07	02:46	03:34	19:36	20:31	21:14
-60	01:53	02:30	03:18	19:52	20:47	21:30

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	04:36	04:50	12:04	10:47	23:12	28(2%)
5	05:04	05:17	12:05	11:37	00:02	29(0%)
6	05:31	05:44	12:05	12:26	00:02	0(0%)

January 07, 08 ,09 (Mon., Tue., Wed.)

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	106°16.2	228°11.0	-16°41.3	102°33.4	1°25.6	214°36.0	-21°44.2	183°10.9	-22°24.7
1	121°18.7	243°10.9	-16°41.8	117°34.4	1°26.4	229°37.9	-21°44.2	198°13.0	-22°24.7
2	136°21.2	258°10.8	-16°42.4	132°35.3	1°27.1	244°39.8	-21°44.3	213°15.1	-22°24.7
3	151°23.6	273°10.6	-16°43.0	147°36.3	1°27.8	259°41.7	-21°44.3	228°17.3	-22°24.6
4	166°26.1	288°10.5	-16°43.5	162°37.2	1°28.5	274°43.6	-21°44.4	243°19.4	-22°24.6
5	181°28.6	303°10.3	-16°44.1	177°38.1	1°29.2	289°45.5	-21°44.5	258°21.6	-22°24.6
6	196°31.0	318°10.2	-16°44.6	192°39.1	1°29.9	304°47.5	-21°44.5	273°23.7	-22°24.6
7	211°33.5	333°10.0	-16°45.2	207°40.0	1°30.7	319°49.4	-21°44.6	288°25.9	-22°24.5
8	226°36.0	348°09.9	-16°45.8	222°40.9	1°31.4	334°51.3	-21°44.7	303°28.0	-22°24.5
9	241°38.4	3°09.7	-16°46.3	237°41.9	1°32.1	349°53.2	-21°44.7	318°30.2	-22°24.5
10	256°40.9	18°09.6	-16°46.9	252°42.8	1°32.8	4°55.1	-21°44.8	333°32.3	-22°24.5
11	271°43.3	33°09.4	-16°47.4	267°43.7	1°33.5	19°57.1	-21°44.9	348°34.5	-22°24.4
12	286°45.8	48°09.3	-16°48.0	282°44.7	1°34.3	34°59.0	-21°44.9	3°36.6	-22°24.4
13	301°48.3	63°09.1	-16°48.5	297°45.6	1°35.0	50°00.9	-21°45.0	18°38.7	-22°24.4
14	316°50.7	78°09.0	-16°49.1	312°46.6	1°35.7	65°02.8	-21°45.1	33°40.9	-22°24.4
15	331°53.2	93°08.8	-16°49.7	327°47.5	1°36.4	80°04.7	-21°45.1	48°43.0	-22°24.4
16	346°55.7	108°08.7	-16°50.2	342°48.4	1°37.1	95°06.6	-21°45.2	63°45.2	-22°24.3
17	1°58.1	123°08.5	-16°50.8	357°49.4	1°37.8	110°08.6	-21°45.3	78°47.3	-22°24.3
18	17°00.6	138°08.4	-16°51.3	12°50.3	1°38.6	125°10.5	-21°45.3	93°49.5	-22°24.3
19	32°03.1	153°08.2	-16°51.9	27°51.2	1°39.3	140°12.4	-21°45.4	108°51.6	-22°24.3
20	47°05.5	168°08.1	-16°52.4	42°52.2	1°40.0	155°14.3	-21°45.4	123°53.8	-22°24.2
21	62°08.0	183°07.9	-16°53.0	57°53.1	1°40.7	170°16.2	-21°45.5	138°55.9	-22°24.2
22	77°10.5	198°07.7	-16°53.5	72°54.0	1°41.4	185°18.2	-21°45.6	153°58.1	-22°24.2
23	92°12.9	213°07.6	-16°54.1	87°55.0	1°42.1	200°20.1	-21°45.6	169°00.2	-22°24.2
Mer.pass.:16:52		v-0.1 d-0.6 m-4.3		v0.9 d0.7 m0.6		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	107°15.4	228°07.4	-16°54.7	102°55.9	1°42.9	215°22.0	-21°45.7	184°02.4	-22°24.1
1	122°17.8	243°07.3	-16°55.2	117°56.8	1°43.6	230°23.9	-21°45.8	199°04.5	-22°24.1
2	137°20.3	258°07.1	-16°55.8	132°57.8	1°44.3	245°25.8	-21°45.8	214°06.7	-22°24.1
3	152°22.8	273°06.9	-16°56.3	147°58.7	1°45.0	260°27.8	-21°45.9	229°08.8	-22°24.1
4	167°25.2	288°06.8	-16°56.9	162°59.7	1°45.7	275°29.7	-21°46.0	244°10.9	-22°24.0
5	182°27.7	303°06.6	-16°57.4	178°00.6	1°46.4	290°31.6	-21°46.0	259°13.1	-22°24.0
6	197°30.2	318°06.4	-16°58.0	193°01.5	1°47.2	305°33.5	-21°46.1	274°15.2	-22°24.0
7	212°32.6	333°06.3	-16°58.5	208°02.5	1°47.9	320°35.4	-21°46.1	289°17.4	-22°24.0
8	227°35.1	348°06.1	-16°59.1	223°03.4	1°48.6	335°37.4	-21°46.2	304°19.5	-22°23.9
9	242°37.6	3°05.9	-16°59.6	238°04.3	1°49.3	350°39.3	-21°46.3	319°21.7	-22°23.9
10	257°40.0	18°05.8	-17°00.2	253°05.3	1°50.0	5°41.2	-21°46.3	334°23.8	-22°23.9
11	272°42.5	33°05.6	-17°00.7	268°06.2	1°50.8	20°43.1	-21°46.4	349°26.0	-22°23.9
12	287°45.0	48°05.4	-17°01.3	283°07.1	1°51.5	35°45.0	-21°46.5	4°28.1	-22°23.8
13	302°47.4	63°05.3	-17°01.8	298°08.1	1°52.2	50°47.0	-21°46.5	19°30.3	-22°23.8
14	317°49.9	78°05.1	-17°02.4	313°09.0	1°52.9	65°48.9	-21°46.6	34°32.4	-22°23.8
15	332°52.3	93°04.9	-17°02.9	328°09.9	1°53.6	80°50.8	-21°46.7	49°34.6	-22°23.8
16	347°54.8	108°04.7	-17°03.5	343°10.9	1°54.3	95°52.7	-21°46.7	64°36.7	-22°23.7
17	2°57.3	123°04.6	-17°04.0	358°11.8	1°55.1	110°54.7	-21°46.8	79°38.8	-22°23.7
18	17°59.7	138°04.4	-17°04.6	13°12.7	1°55.8	125°56.6	-21°46.8	94°41.0	-22°23.7
19	33°02.2	153°04.2	-17°05.1	28°13.7	1°56.5	140°58.5	-21°46.9	109°43.1	-22°23.7
20	48°04.7	168°04.0	-17°05.7	43°14.6	1°57.2	156°00.4	-21°47.0	124°45.3	-22°23.7
21	63°07.1	183°03.8	-17°06.2	58°15.5	1°57.9	171°02.3	-21°47.0	139°47.4	-22°23.6
22	78°09.6	198°03.7	-17°06.8	73°16.5	1°58.6	186°04.3	-21°47.1	154°49.6	-22°23.6
23	93°12.1	213°03.5	-17°07.3	88°17.4	1°59.4	201°06.2	-21°47.2	169°51.7	-22°23.6
Mer.pass.:16:48		v-0.2 d-0.6 m-4.3		v0.9 d0.7 m0.6		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	108°14.5	228°03.3	-17°07.9	103°18.3	2°00.1	216°08.1	-21°47.2	184°53.9	-22°23.6
1	123°17.0	243°03.1	-17°08.4	118°19.3	2°00.8	231°10.0	-21°47.3	199°56.0	-22°23.5
2	138°19.4	258°02.9	-17°09.0	133°20.2	2°01.5	246°12.0	-21°47.4	214°58.2	-22°23.5
3	153°21.9	273°02.7	-17°09.5	148°21.1	2°02.2	261°13.9	-21°47.4	230°00.3	-22°23.5
4	168°24.4	288°02.6	-17°10.0	163°22.1	2°02.9	276°15.8	-21°47.5	245°02.5	-22°23.5
5	183°26.8	303°02.4	-17°10.6	178°23.0	2°03.7	291°17.7	-21°47.5	260°04.6	-22°23.4
6	198°29.3	318°02.2	-17°11.1	193°23.9	2°04.4	306°19.6	-21°47.6	275°06.8	-22°23.4
7	213°31.8	333°02.0	-17°11.7	208°24.9	2°05.1	321°21.6	-21°47.7	290°08.9	-22°23.4
8	228°34.2	348°01.8	-17°12.2	223°25.8	2°05.8	336°23.5	-21°47.7	305°11.0	-22°23.4
9	243°36.7	3°01.6	-17°12.8	238°26.7	2°06.5	351°25.4	-21°47.8	320°13.2	-22°23.3
10	258°39.2	18°01.4	-17°13.3	253°27.7	2°07.2	6°27.3	-21°47.9	335°15.3	-22°23.3
11	273°41.6	33°01.2	-17°13.9	268°28.6	2°08.0	21°29.3	-21°47.9	350°17.5	-22°23.3
12	288°44.1	48°01.0	-17°14.4	283°29.5	2°08.7	36°31.2	-21°48.0	5°19.6	-22°23.3
13	303°46.6	63°00.8	-17°14.9	298°30.5	2°09.4	51°33.1	-21°48.0	20°21.8	-22°23.2
14	318°49.0	78°00.7	-17°15.5	313°31.4	2°10.1	66°35.0	-21°48.1	35°23.9	-22°23.2
15	333°51.5	93°00.5	-17°16.0	328°32.3	2°10.8	81°37.0	-21°48.2	50°26.1	-22°23.2
16	348°53.9	108°00.3	-17°16.6	343°33.3	2°11.5	96°38.9	-21°48.2	65°28.2	-22°23.2
17	3°56.4	123°00.1	-17°17.1	358°34.2	2°12.2	111°40.8	-21°48.3	80°30.4	-22°23.1
18	18°58.9	137°59.9	-17°17.6	13°35.1	2°13.0	126°42.7	-21°48.3	95°32.5	-22°23.1
19	34°01.3	152°59.7	-17°18.2	28°36.1	2°13.7	141°44.6	-21°48.4	110°34.7	-22°23.1
20	49°03.8	167°59.5	-17°18.7	43°37.0	2°14.4	156°46.6	-21°48.5	125°36.8	-22°23.1
21	64°06.3	182°59.3	-17°19.3	58°37.9	2°15.1	171°48.5	-21°48.5	140°39.0	-22°23.0
22	79°08.7	197°59.1	-17°19.8	73°38.9	2°15.8	186°50.4	-21°48.6	155°41.1	-22°23.0
23	94°11.2	212°58.9	-17°20.3	88°39.8	2°16.5	201°52.3	-21°48.7	170°43.3	-22°23.0
Mer.pass.:16:44		v-0.2 d-0.5 m-4.2		v0.9 d0.7 m0.6		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

Star	SHA	Dec
Alpheratz	357°39.7	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.2	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.9	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°51.8	89°20.8
Akamar	315°15.3	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.5
Sirius	258°29.9	-16°44.5
Adara	255°09.2	-29°00.0
Procyon	244°55.4	5°10.6
Pollux	243°22.6	27°58.6
Avior	234°15.9	-59°34.2
Suhail	222°49.2	-43°30.5
Miaplacidus	221°38.1	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°46.7	61°38.7
Denebola	182°29.6	14°27.9
Gienah	175°48.3	-17°38.7
Acrux	173°04.9	-63°11.9
Gacrux	171°56.6	-57°12.8
Alioth	166°17.4	55°51.2
Spica	158°27.3	-11°15.4
Alcaid	152°56.0	49°13.0
Hadar	148°42.6	-60°27.4
Menkent	148°03.2	-36°27.5
Arcturus	145°52.2	19°05.3
Rigil Kent.	139°46.8	-60°54.4
Zubenelg.	137°01.4	-16°07.0
Kochab	137°20.7	74°04.5
Alphecca	126°08.1	26°39.1
Antares	112°21.9	-26°28.2
Atria	107°20.8	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.2	-37°06.8
Rasalhague	96°03.3	12°32.9
Etamin	90°44.9	51°29.2
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.9	38°48.1
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.9	-56°40.5
Deneb	49°29.3	45°21.0
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.4

2019/1/7	SHA	Mer.pass
Venus	121°54.8	08:47
Mars	356°17.2	17:09
Jupiter	108°19.7	09:40
Saturn	76°54.6	11:46

2019/1/8	SHA	Mer.pass
Venus	120°52.0	08:48
Mars	355°40.5	17:07
Jupiter	108°06.6	09:37
Saturn	76°47.0	11:42

2019/1/9	SHA	Mer.pass
Venus	119°48.8	08:48
Mars	355°03.8	17:06
Jupiter	107°53.6	09:34
Saturn	76°39.4	11:39

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°30.8	-22°25.9	167°35.9	11.6	-20°49.0	3.0	54.2
1	193°30.5	-22°25.6	182°06.5	11.7	-20°46.0	3.1	54.2
2	208°30.2	-22°25.3	196°37.2	11.7	-20°42.8	3.2	54.2
3	223°30.0	-22°25.0	211°07.9	11.7	-20°39.6	3.3	54.2
4	238°29.7	-22°24.7	225°38.7	11.8	-20°36.3	3.4	54.2
5	253°29.4	-22°24.4	240°09.4	11.8	-20°32.9	3.5	54.2
6	268°29.1	-22°24.0	254°40.3	11.8	-20°29.4	3.5	54.2
7	283°28.9	-22°23.7	269°11.1	11.9	-20°25.8	3.6	54.2
8	298°28.6	-22°23.4	283°42.0	11.9	-20°22.1	3.7	54.2
9	313°28.3	-22°23.1	298°12.9	11.9	-20°18.3	3.8	54.2
10	328°28.1	-22°22.8	312°43.9	12.0	-20°14.5	3.9	54.2
11	343°27.8	-22°22.5	327°14.9	12.0	-20°10.5	4.0	54.1
12	358°27.5	-22°22.1	341°45.9	12.1	-20°06.4	4.1	54.1
13	13°27.2	-22°21.8	356°17.0	12.1	-20°02.3	4.2	54.1
14	28°27.0	-22°21.5	10°48.1	12.1	-19°58.0	4.3	54.1
15	43°26.7	-22°21.2	25°19.2	12.2	-19°53.7	4.4	54.1
16	58°26.4	-22°20.9	39°50.4	12.2	-19°49.3	4.5	54.1
17	73°26.2	-22°20.5	54°21.6	12.2	-19°44.8	4.6	54.1
18	88°25.9	-22°20.2	68°52.9	12.3	-19°40.2	4.6	54.1
19	103°25.6	-22°19.9	83°24.2	12.3	-19°35.5	4.7	54.1
20	118°25.4	-22°19.6	97°55.5	12.4	-19°30.7	4.8	54.1
21	133°25.1	-22°19.2	112°26.9	12.4	-19°25.9	4.9	54.1
22	148°24.8	-22°18.9	126°58.3	12.4	-19°20.9	5.0	54.1
23	163°24.5	-22°18.6	141°29.8	12.5	-19°15.9	5.1	54.1
	SD.=16.3	d=0.3			S.D.=14.8		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°24.3	-22°18.3	156°01.3	12.5	-19°10.7	5.2	54.1
1	193°24.0	-22°17.9	170°32.8	12.6	-19°05.5	5.2	54.1
2	208°23.7	-22°17.6	185°04.4	12.6	-19°00.3	5.3	54.1
3	223°23.5	-22°17.3	199°36.0	12.6	-18°54.9	5.4	54.1
4	238°23.2	-22°17.0	214°07.7	12.7	-18°49.4	5.5	54.0
5	253°22.9	-22°16.6	228°39.4	12.7	-18°43.9	5.6	54.0
6	268°22.7	-22°16.3	243°11.1	12.8	-18°38.3	5.7	54.0
7	283°22.4	-22°16.0	257°42.9	12.8	-18°32.5	5.7	54.0
8	298°22.1	-22°15.6	272°14.7	12.8	-18°26.8	5.8	54.0
9	313°21.9	-22°15.3	286°46.6	12.9	-18°20.9	5.9	54.0
10	328°21.6	-22°15.0	301°18.5	12.9	-18°14.9	6.0	54.0
11	343°21.3	-22°14.6	315°50.4	13.0	-18°08.9	6.1	54.0
12	358°21.1	-22°14.3	330°22.4	13.0	-18°02.8	6.1	54.0
13	13°20.8	-22°13.9	344°54.4	13.0	-17°56.6	6.2	54.0
14	28°20.5	-22°13.6	359°26.5	13.1	-17°50.4	6.3	54.0
15	43°20.3	-22°13.3	13°58.6	13.1	-17°44.0	6.4	54.0
16	58°20.0	-22°12.9	28°30.7	13.2	-17°37.6	6.5	54.0
17	73°19.8	-22°12.6	43°02.9	13.2	-17°31.1	6.5	54.0
18	88°19.5	-22°12.2	57°35.2	13.3	-17°24.6	6.6	54.0
19	103°19.2	-22°11.9	72°07.4	13.3	-17°17.9	6.7	54.0
20	118°19.0	-22°11.6	86°39.8	13.3	-17°11.2	6.8	54.0
21	133°18.7	-22°11.2	101°12.1	13.4	-17°04.4	6.8	54.0
22	148°18.4	-22°10.9	115°44.5	13.4	-16°57.6	6.9	54.0
23	163°18.2	-22°10.5	130°16.9	13.5	-16°50.6	7.0	54.0
	SD.=16.3	d=0.3			S.D.=14.7		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°17.9	-22°10.2	144°49.4	13.5	-16°43.6	7.0	54.0
1	193°17.6	-22°09.8	159°21.9	13.5	-16°36.5	7.1	54.0
2	208°17.4	-22°09.5	173°54.5	13.6	-16°29.4	7.2	54.0
3	223°17.1	-22°09.1	188°27.1	13.6	-16°22.2	7.3	54.0
4	238°16.9	-22°08.8	202°59.7	13.7	-16°14.9	7.3	54.0
5	253°16.6	-22°08.5	217°32.4	13.7	-16°07.5	7.4	54.0
6	268°16.3	-22°08.1	232°05.1	13.7	-16°00.1	7.5	54.0
7	283°16.1	-22°07.8	246°37.9	13.8	-15°52.6	7.5	54.0
8	298°15.8	-22°07.4	261°10.7	13.8	-15°45.1	7.6	54.0
9	313°15.6	-22°07.0	275°43.5	13.9	-15°37.4	7.7	54.0
10	328°15.3	-22°06.7	290°16.4	13.9	-15°29.8	7.7	54.0
11	343°15.0	-22°06.3	304°49.3	13.9	-15°22.0	7.8	54.0
12	358°14.8	-22°06.0	319°22.3	14.0	-15°14.2	7.9	54.0
13	13°14.5	-22°05.6	333°55.2	14.0	-15°06.3	7.9	54.0
14	28°14.3	-22°05.3	348°28.3	14.0	-14°58.4	8.0	54.0
15	43°14.0	-22°04.9	3°01.3	14.1	-14°50.3	8.0	54.0
16	58°13.7	-22°04.6	17°34.4	14.1	-14°42.3	8.1	54.0
17	73°13.5	-22°04.2	32°07.6	14.2	-14°34.1	8.2	54.0
18	88°13.2	-22°03.8	46°40.7	14.2	-14°26.0	8.2	54.0
19	103°13.0	-22°03.5	61°13.9	14.2	-14°17.7	8.3	54.0
20	118°12.7	-22°03.1	75°47.2	14.3	-14°09.4	8.3	54.0
21	133°12.4	-22°02.8	90°20.5	14.3	-14°01.0	8.4	54.0
22	148°12.2	-22°02.4	104°53.8	14.3	-13°52.6	8.5	54.0
23	163°11.9	-22°02.0	119°27.1	14.4	-13°44.1	8.5	54.0
	SD.=16.3	d=0.3			S.D.=14.7		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:15	10:20	–:–	–:–	13:54	15:59
70	07:58	09:37	–:–	–:–	14:37	16:16
68	07:44	09:08	11:10	13:03	15:06	16:30
66	07:33	08:46	10:13	14:00	15:28	16:41
64	07:23	08:29	09:40	14:33	15:45	16:51
62	07:14	08:14	09:16	14:57	15:59	16:59
60	07:07	08:02	08:57	15:17	16:12	17:07
58	07:00	07:51	08:41	15:32	16:22	17:14
56	06:54	07:42	08:28	15:46	16:31	17:20
54	06:48	07:34	08:16	15:57	16:40	17:25
52	06:43	07:26	08:06	16:07	16:47	17:30
50	06:38	07:19	07:57	16:17	16:54	17:35
45	06:28	07:04	07:38	16:36	17:09	17:46
40	06:18	06:52	07:22	16:52	17:22	17:55
35	06:09	06:41	07:09	17:05	17:33	18:04
30	06:01	06:31	06:57	17:16	17:43	18:12
20	05:46	06:13	06:37	17:36	18:00	18:27
10	05:31	05:57	06:19	17:54	18:16	18:43
0	05:15	05:41	06:03	18:10	18:33	18:59
-10	04:57	05:23	05:46	18:27	18:50	19:17
-20	04:35	05:04	05:28	18:45	19:09	19:38
-30	04:08	04:40	05:07	19:06	19:33	20:05
-35	03:50	04:26	04:55	19:18	19:47	20:23
-40	03:28	04:09	04:41	19:32	20:04	20:45
-45	02:60	03:48	04:24	19:49	20:25	21:13
-50	02:19	03:20	04:03	20:10	20:52	21:53
-52	01:55	03:06	03:53	20:20	21:06	22:16
-54	01:22	02:50	03:42	20:31	21:22	22:49
-56	–:–	02:30	03:29	20:44	21:42	–:–
-58	–:–	02:05	03:13	20:59	22:06	–:–
-60	–:–	01:29	02:55	21:17	22:42	–:–

		Moonrise			**Moonset**	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	13:44	12:32	–:–	14:32	17:19
70	–:–	12:15	11:58	–:–	16:01	17:51
68	11:35	11:35	11:33	15:02	16:39	18:15
66	10:55	11:08	11:14	15:42	17:06	18:33
64	10:27	10:47	10:59	16:09	17:27	18:47
62	10:06	10:29	10:46	16:30	17:43	18:60
60	09:49	10:15	10:35	16:47	17:57	19:10
58	09:34	10:03	10:25	17:02	18:09	19:19
56	09:22	09:52	10:17	17:14	18:19	19:27
54	09:11	09:43	10:09	17:24	18:28	19:34
52	09:01	09:35	10:03	17:34	18:36	19:40
50	08:52	09:27	09:57	17:42	18:43	19:46
45	08:34	09:11	09:43	18:00	18:58	19:58
40	08:19	08:58	09:33	18:15	19:11	20:08
35	08:06	08:47	09:23	18:27	19:21	20:16
30	07:55	08:37	09:15	18:38	19:31	20:24
20	07:36	08:20	09:01	18:56	19:47	20:37
10	07:19	08:05	08:48	19:12	20:00	20:48
0	07:04	07:51	08:37	19:27	20:13	20:58
-10	06:48	07:37	08:25	19:42	20:26	21:09
-20	06:32	07:22	08:13	19:57	20:40	21:20
-30	06:12	07:05	07:58	20:16	20:56	21:32
-35	06:01	06:55	07:50	20:26	21:05	21:39
-40	05:48	06:44	07:40	20:38	21:15	21:48
-45	05:33	06:30	07:29	20:52	21:27	21:57
-50	05:14	06:14	07:15	21:09	21:41	22:08
-52	05:06	06:06	07:09	21:17	21:48	22:14
-54	04:56	05:57	07:02	21:26	21:56	22:20
-56	04:45	05:47	06:54	21:36	22:04	22:26
-58	04:32	05:36	06:45	21:48	22:13	22:33
-60	04:17	05:23	06:35	22:01	22:24	22:41

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	05:57	06:10	12:06	13:15	00:51	1(2%)
8	06:23	06:36	12:06	14:02	01:39	2(5%)
9	06:48	07:01	12:07	14:47	02:25	3(10%)

January 10, 11 ,12 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	109°13.7	227°58.7	-17°20.9	103°40.7	2°17.3	216°54.3	-21°48.7	185°45.4	-22°23.0
1	124°16.1	242°58.5	-17°21.4	118°41.7	2°18.0	231°56.2	-21°48.8	200°47.5	-22°22.9
2	139°18.6	257°58.3	-17°22.0	133°42.6	2°18.7	246°58.1	-21°48.8	215°49.7	-22°22.9
3	154°21.1	272°58.1	-17°22.5	148°43.5	2°19.4	262°00.0	-21°48.9	230°51.8	-22°22.9
4	169°23.5	287°57.8	-17°23.0	163°44.5	2°20.1	277°02.0	-21°49.0	245°54.0	-22°22.9
5	184°26.0	302°57.6	-17°23.6	178°45.4	2°20.8	292°03.9	-21°49.0	260°56.1	-22°22.8
6	199°28.4	317°57.4	-17°24.1	193°46.3	2°21.6	307°05.8	-21°49.1	275°58.3	-22°22.8
7	214°30.9	332°57.2	-17°24.6	208°47.3	2°22.3	322°07.7	-21°49.2	291°00.4	-22°22.8
8	229°33.4	347°57.0	-17°25.2	223°48.2	2°23.0	337°09.7	-21°49.2	306°02.6	-22°22.8
9	244°35.8	2°56.8	-17°25.7	238°49.1	2°23.7	352°11.6	-21°49.3	321°04.7	-22°22.7
10	259°38.3	17°56.6	-17°26.3	253°50.0	2°24.4	7°13.5	-21°49.3	336°06.9	-22°22.7
11	274°40.8	32°56.4	-17°26.8	268°51.0	2°25.1	22°15.5	-21°49.4	351°09.0	-22°22.7
12	289°43.2	47°56.2	-17°27.3	283°51.9	2°25.8	37°17.4	-21°49.5	6°11.2	-22°22.7
13	304°45.7	62°56.0	-17°27.9	298°52.8	2°26.6	52°19.3	-21°49.5	21°13.3	-22°22.6
14	319°48.2	77°55.7	-17°28.4	313°53.8	2°27.3	67°21.2	-21°49.6	36°15.5	-22°22.6
15	334°50.6	92°55.5	-17°28.9	328°54.7	2°28.0	82°23.2	-21°49.6	51°17.6	-22°22.6
16	349°53.1	107°55.3	-17°29.5	343°55.6	2°28.7	97°25.1	-21°49.7	66°19.8	-22°22.6
17	4°55.6	122°55.1	-17°30.0	358°56.6	2°29.4	112°27.0	-21°49.8	81°21.9	-22°22.6
18	19°58.0	137°54.9	-17°30.5	13°57.5	2°30.1	127°28.9	-21°49.8	96°24.1	-22°22.5
19	35°00.5	152°54.7	-17°31.1	28°58.4	2°30.8	142°30.9	-21°49.9	111°26.2	-22°22.5
20	50°02.9	167°54.4	-17°31.6	43°59.4	2°31.6	157°32.8	-21°49.9	126°28.3	-22°22.5
21	65°05.4	182°54.2	-17°32.1	59°00.3	2°32.3	172°34.7	-21°50.0	141°30.5	-22°22.5
22	80°07.9	197°54.0	-17°32.6	74°01.2	2°33.0	187°36.6	-21°50.1	156°32.6	-22°22.4
23	95°10.3	212°53.8	-17°33.2	89°02.1	2°33.7	202°38.6	-21°50.1	171°34.8	-22°22.4
Mer.pass.:16:40		v-0.2 d-0.5 m-4.2		v0.9 d0.7 m0.6		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	110°12.8	227°53.5	-17°33.7	104°03.1	2°34.4	217°40.5	-21°50.2	186°36.9	-22°22.4
1	125°15.3	242°53.3	-17°34.2	119°04.0	2°35.1	232°42.4	-21°50.3	201°39.1	-22°22.4
2	140°17.7	257°53.1	-17°34.8	134°04.9	2°35.9	247°44.4	-21°50.3	216°41.2	-22°22.3
3	155°20.2	272°52.9	-17°35.3	149°05.9	2°36.6	262°46.3	-21°50.4	231°43.4	-22°22.3
4	170°22.7	287°52.6	-17°35.8	164°06.8	2°37.3	277°48.2	-21°50.4	246°45.5	-22°22.3
5	185°25.1	302°52.4	-17°36.3	179°07.7	2°38.0	292°50.1	-21°50.5	261°47.7	-22°22.3
6	200°27.6	317°52.2	-17°36.9	194°08.7	2°38.7	307°52.1	-21°50.6	276°49.8	-22°22.2
7	215°30.0	332°52.0	-17°37.4	209°09.6	2°39.4	322°54.0	-21°50.6	291°52.0	-22°22.2
8	230°32.5	347°51.7	-17°37.9	224°10.5	2°40.1	337°55.9	-21°50.7	306°54.1	-22°22.2
9	245°35.0	2°51.5	-17°38.5	239°11.5	2°40.9	352°57.8	-21°50.7	321°56.3	-22°22.2
10	260°37.4	17°51.3	-17°39.0	254°12.4	2°41.6	7°59.8	-21°50.8	336°58.4	-22°22.1
11	275°39.9	32°51.0	-17°39.5	269°13.3	2°42.3	23°01.7	-21°50.9	352°00.6	-22°22.1
12	290°42.4	47°50.8	-17°40.0	284°14.2	2°43.0	38°03.6	-21°50.9	7°02.7	-22°22.1
13	305°44.8	62°50.6	-17°40.6	299°15.2	2°43.7	53°05.6	-21°51.0	22°04.9	-22°22.1
14	320°47.3	77°50.3	-17°41.1	314°16.1	2°44.4	68°07.5	-21°51.0	37°07.0	-22°22.0
15	335°49.8	92°50.1	-17°41.6	329°17.0	2°45.1	83°09.4	-21°51.1	52°09.2	-22°22.0
16	350°52.2	107°49.9	-17°42.1	344°18.0	2°45.8	98°11.4	-21°51.2	67°11.3	-22°22.0
17	5°54.7	122°49.6	-17°42.7	359°18.9	2°46.6	113°13.3	-21°51.2	82°13.4	-22°22.0
18	20°57.2	137°49.4	-17°43.2	14°19.8	2°47.3	128°15.2	-21°51.3	97°15.6	-22°21.9
19	35°59.6	152°49.2	-17°43.7	29°20.7	2°48.0	143°17.1	-21°51.3	112°17.7	-22°21.9
20	51°02.1	167°48.9	-17°44.2	44°21.7	2°48.7	158°19.1	-21°51.4	127°19.9	-22°21.9
21	66°04.5	182°48.7	-17°44.7	59°22.6	2°49.4	173°21.0	-21°51.5	142°22.0	-22°21.9
22	81°07.0	197°48.4	-17°45.3	74°23.5	2°50.1	188°22.9	-21°51.5	157°24.2	-22°21.8
23	96°09.5	212°48.2	-17°45.8	89°24.5	2°50.8	203°24.9	-21°51.6	172°26.3	-22°21.8
Mer.pass.:16:36		v-0.2 d-0.5 m-4.2		v0.9 d0.7 m0.6		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	111°11.9	227°47.9	-17°46.3	104°25.4	2°51.6	218°26.8	-21°51.6	187°28.5	-22°21.8
1	126°14.4	242°47.7	-17°46.8	119°26.3	2°52.3	233°28.7	-21°51.7	202°30.6	-22°21.8
2	141°16.9	257°47.5	-17°47.3	134°27.3	2°53.0	248°30.6	-21°51.8	217°32.8	-22°21.7
3	156°19.3	272°47.2	-17°47.9	149°28.2	2°53.7	263°32.6	-21°51.8	232°34.9	-22°21.7
4	171°21.8	287°47.0	-17°48.4	164°29.1	2°54.4	278°34.5	-21°51.9	247°37.1	-22°21.7
5	186°24.3	302°46.7	-17°48.9	179°30.0	2°55.1	293°36.4	-21°51.9	262°39.2	-22°21.7
6	201°26.7	317°46.5	-17°49.4	194°31.0	2°55.8	308°38.4	-21°52.0	277°41.4	-22°21.6
7	216°29.2	332°46.2	-17°49.9	209°31.9	2°56.6	323°40.3	-21°52.1	292°43.5	-22°21.6
8	231°31.6	347°46.0	-17°50.5	224°32.8	2°57.3	338°42.2	-21°52.1	307°45.7	-22°21.6
9	246°34.1	2°45.7	-17°51.0	239°33.8	2°58.0	353°44.2	-21°52.2	322°47.8	-22°21.6
10	261°36.6	17°45.5	-17°51.5	254°34.7	2°58.7	8°46.1	-21°52.2	337°50.0	-22°21.5
11	276°39.0	32°45.2	-17°52.0	269°35.6	2°59.4	23°48.0	-21°52.3	352°52.1	-22°21.5
12	291°41.5	47°45.0	-17°52.5	284°36.5	3°00.1	38°50.0	-21°52.4	7°54.3	-22°21.5
13	306°44.0	62°44.7	-17°53.0	299°37.5	3°00.8	53°51.9	-21°52.4	22°56.4	-22°21.5
14	321°46.4	77°44.5	-17°53.5	314°38.4	3°01.5	68°53.8	-21°52.5	37°58.6	-22°21.4
15	336°48.9	92°44.2	-17°54.1	329°39.3	3°02.3	83°55.8	-21°52.5	53°00.7	-22°21.4
16	351°51.4	107°43.9	-17°54.6	344°40.2	3°03.0	98°57.7	-21°52.6	68°02.9	-22°21.4
17	6°53.8	122°43.7	-17°55.1	359°41.2	3°03.7	113°59.6	-21°52.6	83°05.0	-22°21.4
18	21°56.3	137°43.4	-17°55.6	14°42.1	3°04.4	129°01.5	-21°52.7	98°07.2	-22°21.3
19	36°58.8	152°43.2	-17°56.1	29°43.0	3°05.1	144°03.5	-21°52.8	113°09.3	-22°21.3
20	52°01.2	167°42.9	-17°56.6	44°44.0	3°05.8	159°05.4	-21°52.8	128°11.5	-22°21.3
21	67°03.7	182°42.7	-17°57.1	59°44.9	3°06.5	174°07.3	-21°52.9	143°13.6	-22°21.3
22	82°06.1	197°42.4	-17°57.7	74°45.8	3°07.2	189°09.3	-21°52.9	158°15.8	-22°21.2
23	97°08.6	212°42.1	-17°58.2	89°46.7	3°08.0	204°11.2	-21°53.0	173°17.9	-22°21.2
Mer.pass.:16:32		v-0.2 d-0.5 m-4.2		v0.9 d0.7 m0.6		v1.9 d-0.1 m-1.6		v2.1 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.8
Ankaa	353°12.0	-42°12.5
Schedar	349°36.3	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.9	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°53.1	89°20.8
Akamar	315°15.3	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.6
Sirius	258°29.9	-16°44.5
Adara	255°09.1	-29°00.1
Procyon	244°55.3	5°10.6
Pollux	243°22.6	27°58.6
Avior	234°15.8	-59°34.2
Suhail	222°49.2	-43°30.5
Miaplacidus	221°38.0	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°46.7	61°38.7
Denebola	182°29.6	14°27.9
Gienah	175°48.3	-17°38.7
Acrux	173°04.9	-63°11.9
Gacrux	171°56.5	-57°12.8
Alioth	166°17.4	55°51.2
Spica	158°27.3	-11°15.5
Alcaid	152°56.0	49°13.0
Hadar	148°42.6	-60°27.4
Menkent	148°03.2	-36°27.5
Arcturus	145°52.2	19°05.3
Rigil Kent.	139°46.8	-60°54.4
Zubenelg.	137°01.4	-16°07.0
Kochab	137°20.6	74°04.5
Alphecca	126°08.0	26°39.1
Antares	112°21.9	-26°28.2
Atria	107°20.7	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.3	12°32.9
Etamin	90°44.9	51°29.2
Kaus Aust.	83°39.2	-34°22.4
Vega	80°36.8	38°48.1
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.9	-56°40.4
Deneb	49°29.3	45°21.0
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.7	15°18.4

2019/1/1	**SHA**	**Mer.pass**
Venus	118°45.0	08:48
Mars	354°27.1	17:04
Jupiter	107°40.6	09:31
Saturn	76°31.7	11:35

2019/1/1	**SHA**	**Mer.pass**
Venus	117°40.7	08:49
Mars	353°50.3	17:03
Jupiter	107°27.7	09:28
Saturn	76°24.1	11:32

2019/1/1	**SHA**	**Mer.pass**
Venus	116°36.0	08:49
Mars	353°13.5	17:01
Jupiter	107°14.9	09:25
Saturn	76°16.5	11:28

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°11.7	-22°01.7	134°00.5	14.4	-13°35.6	8.6	54.0
1	193°11.4	-22°01.3	148°33.9	14.4	-13°27.0	8.6	54.0
2	208°11.2	-22°00.9	163°07.4	14.5	-13°18.3	8.7	54.0
3	223°10.9	-22°00.6	177°40.8	14.5	-13°09.6	8.7	54.0
4	238°10.6	-22°00.2	192°14.3	14.5	-13°00.8	8.8	54.0
5	253°10.4	-21°59.8	206°47.9	14.6	-12°52.0	8.8	54.1
6	268°10.1	-21°59.5	221°21.5	14.6	-12°43.1	8.9	54.1
7	283°09.9	-21°59.1	235°55.1	14.6	-12°34.2	9.0	54.1
8	298°09.6	-21°58.7	250°28.7	14.6	-12°25.2	9.0	54.1
9	313°09.4	-21°58.4	265°02.4	14.7	-12°16.2	9.1	54.1
10	328°09.1	-21°58.0	279°36.0	14.7	-12°07.1	9.1	54.1
11	343°08.9	-21°57.6	294°09.8	14.7	-11°58.0	9.2	54.1
12	358°08.6	-21°57.3	308°43.5	14.8	-11°48.8	9.2	54.1
13	13°08.4	-21°56.9	323°17.3	14.8	-11°39.5	9.3	54.1
14	28°08.1	-21°56.5	337°51.1	14.8	-11°30.3	9.3	54.1
15	43°07.8	-21°56.1	352°24.9	14.8	-11°20.9	9.4	54.1
16	58°07.6	-21°55.8	6°58.8	14.9	-11°11.5	9.4	54.1
17	73°07.3	-21°55.4	21°32.7	14.9	-11°02.1	9.4	54.1
18	88°07.1	-21°55.0	36°06.6	14.9	-10°52.6	9.5	54.1
19	103°06.8	-21°54.6	50°40.5	14.9	-10°43.1	9.5	54.2
20	118°06.6	-21°54.3	65°14.4	15.0	-10°33.6	9.6	54.2
21	133°06.3	-21°53.9	79°48.4	15.0	-10°24.0	9.6	54.2
22	148°06.1	-21°53.5	94°22.4	15.0	-10°14.3	9.7	54.2
23	163°05.8	-21°53.1	108°56.4	15.0	-10°04.6	9.7	54.2
	SD.=16.3	d=0.4			S.D.=14.7		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°05.6	-21°52.7	123°30.5	15.1	-9°54.9	9.8	54.2
1	193°05.3	-21°52.4	138°04.5	15.1	-9°45.1	9.8	54.2
2	208°05.1	-21°52.0	152°38.6	15.1	-9°35.3	9.8	54.2
3	223°04.8	-21°51.6	167°12.7	15.1	-9°25.4	9.9	54.2
4	238°04.6	-21°51.2	181°46.8	15.1	-9°15.5	9.9	54.2
5	253°04.3	-21°50.8	196°21.0	15.1	-9°05.5	10.0	54.2
6	268°04.1	-21°50.4	210°55.1	15.2	-8°55.6	10.0	54.3
7	283°03.8	-21°50.0	225°29.3	15.2	-8°45.5	10.0	54.3
8	298°03.6	-21°49.7	240°03.5	15.2	-8°35.5	10.1	54.3
9	313°03.3	-21°49.3	254°37.7	15.2	-8°25.4	10.1	54.3
10	328°03.1	-21°48.9	269°11.9	15.2	-8°15.2	10.2	54.3
11	343°02.8	-21°48.5	283°46.1	15.2	-8°05.1	10.2	54.3
12	358°02.6	-21°48.1	298°20.4	15.2	-7°54.8	10.2	54.3
13	13°02.3	-21°47.7	312°54.6	15.3	-7°44.6	10.3	54.3
14	28°02.1	-21°47.3	327°28.9	15.3	-7°34.3	10.3	54.4
15	43°01.8	-21°46.9	342°03.2	15.3	-7°24.0	10.3	54.4
16	58°01.6	-21°46.5	356°37.4	15.3	-7°13.6	10.4	54.4
17	73°01.3	-21°46.1	11°11.7	15.3	-7°03.3	10.4	54.4
18	88°01.1	-21°45.7	25°46.0	15.3	-6°52.8	10.4	54.4
19	103°00.9	-21°45.4	40°20.4	15.3	-6°42.4	10.5	54.4
20	118°00.6	-21°45.0	54°54.7	15.3	-6°31.9	10.5	54.4
21	133°00.4	-21°44.6	69°29.0	15.3	-6°21.4	10.5	54.5
22	148°00.1	-21°44.2	84°03.3	15.3	-6°10.9	10.6	54.5
23	162°59.9	-21°43.8	98°37.7	15.3	-6°00.3	10.6	54.5
	SD.=16.3	d=0.4			S.D.=14.8		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°59.6	-21°43.4	113°12.0	15.3	-5°49.7	10.6	54.5
1	192°59.4	-21°43.0	127°46.3	15.3	-5°39.1	10.6	54.5
2	207°59.1	-21°42.6	142°20.7	15.3	-5°28.4	10.7	54.5
3	222°58.9	-21°42.2	156°55.0	15.3	-5°17.7	10.7	54.6
4	237°58.7	-21°41.8	171°29.4	15.3	-5°07.0	10.7	54.6
5	252°58.4	-21°41.4	186°03.7	15.3	-4°56.3	10.8	54.6
6	267°58.2	-21°41.0	200°38.1	15.3	-4°45.5	10.8	54.6
7	282°57.9	-21°40.6	215°12.4	15.3	-4°34.7	10.8	54.6
8	297°57.7	-21°40.1	229°46.7	15.3	-4°23.9	10.8	54.6
9	312°57.4	-21°39.7	244°21.1	15.3	-4°13.1	10.9	54.7
10	327°57.2	-21°39.3	258°55.4	15.3	-4°02.2	10.9	54.7
11	342°57.0	-21°38.9	273°29.7	15.3	-3°51.3	10.9	54.7
12	357°56.7	-21°38.5	288°04.1	15.3	-3°40.4	10.9	54.7
13	12°56.5	-21°38.1	302°38.4	15.3	-3°29.5	10.9	54.7
14	27°56.2	-21°37.7	317°12.7	15.3	-3°18.5	11.0	54.8
15	42°56.0	-21°37.3	331°47.0	15.3	-3°07.5	11.0	54.8
16	57°55.8	-21°36.9	346°21.3	15.3	-2°56.6	11.0	54.8
17	72°55.5	-21°36.5	0°55.5	15.3	-2°45.5	11.0	54.8
18	87°55.3	-21°36.1	15°29.8	15.3	-2°34.5	11.0	54.8
19	102°55.0	-21°35.6	30°04.1	15.2	-2°23.5	11.1	54.9
20	117°54.8	-21°35.2	44°38.3	15.2	-2°12.4	11.1	54.9
21	132°54.6	-21°34.8	59°12.5	15.2	-2°01.3	11.1	54.9
22	147°54.3	-21°34.4	73°46.8	15.2	-1°50.2	11.1	54.9
23	162°54.1	-21°34.0	88°20.9	15.2	-1°39.1	11.1	55.0
	SD.=16.3	d=0.4			S.D.=14.9		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:10	10:09	–:–	–:–	14:08	16:07
70	07:54	09:30	–:–	–:–	14:47	16:23
68	07:40	09:02	10:54	13:22	15:14	16:36
66	07:30	08:42	10:05	14:11	15:34	16:47
64	07:20	08:25	09:35	14:42	15:51	16:56
62	07:12	08:11	09:12	15:04	16:05	17:04
60	07:05	07:60	08:54	15:22	16:17	17:11
58	06:58	07:49	08:38	15:38	16:27	17:18
56	06:52	07:40	08:26	15:51	16:36	17:24
54	06:47	07:32	08:14	16:02	16:44	17:29
52	06:42	07:25	08:04	16:12	16:51	17:34
50	06:37	07:18	07:55	16:21	16:58	17:39
45	06:27	07:04	07:37	16:39	17:12	17:49
40	06:18	06:51	07:21	16:55	17:25	17:58
35	06:09	06:41	07:08	17:08	17:35	18:06
30	06:01	06:31	06:57	17:19	17:45	18:14
20	05:47	06:14	06:37	17:38	18:02	18:29
10	05:32	05:58	06:20	17:55	18:18	18:44
0	05:16	05:42	06:04	18:12	18:34	18:60
-10	04:58	05:25	05:48	18:28	18:50	19:17
-20	04:37	05:06	05:30	18:45	19:09	19:38
-30	04:10	04:43	05:10	19:06	19:32	20:05
-35	03:53	04:29	04:58	19:17	19:46	20:22
-40	03:32	04:12	04:44	19:31	20:03	20:43
-45	03:04	03:51	04:28	19:48	20:24	21:11
-50	02:25	03:25	04:07	20:08	20:50	21:50
-52	02:02	03:11	03:57	20:18	21:03	22:12
-54	01:32	02:55	03:46	20:29	21:19	22:41
-56	00:29	02:37	03:34	20:41	21:38	23:37
-58	–:–	02:13	03:19	20:56	22:01	–:–
-60	–:–	01:40	03:01	21:13	22:33	–:–

Lat.	**Moonrise**			**Moonset**		
	Thu	Fri	Sat	Thu	Fri	Sat
72	12:07	11:49	11:35	19:14	21:01	22:44
70	11:47	11:38	11:30	19:33	21:10	22:46
68	11:31	11:28	11:25	19:47	21:18	22:49
66	11:18	11:20	11:22	19:59	21:25	22:50
64	11:07	11:14	11:19	20:09	21:30	22:52
62	10:58	11:08	11:16	20:17	21:35	22:53
60	10:50	11:03	11:14	20:24	21:39	22:54
58	10:43	10:58	11:12	20:30	21:42	22:55
56	10:37	10:54	11:10	20:36	21:45	22:56
54	10:31	10:51	11:08	20:41	21:48	22:57
52	10:26	10:47	11:07	20:45	21:51	22:57
50	10:22	10:44	11:05	20:49	21:53	22:58
45	10:12	10:38	11:02	20:58	21:58	22:59
40	10:04	10:32	10:59	21:05	22:03	23:01
35	09:57	10:28	10:57	21:11	22:06	23:02
30	09:50	10:23	10:55	21:17	22:09	23:02
20	09:39	10:16	10:52	21:26	22:15	23:04
10	09:30	10:10	10:49	21:34	22:20	23:05
0	09:21	10:04	10:46	21:42	22:24	23:06
-10	09:12	09:58	10:43	21:49	22:29	23:08
-20	09:02	09:51	10:40	21:57	22:33	23:09
-30	08:51	09:44	10:37	22:06	22:39	23:10
-35	08:45	09:40	10:35	22:11	22:42	23:11
-40	08:37	09:35	10:32	22:17	22:45	23:12
-45	08:29	09:29	10:30	22:24	22:49	23:13
-50	08:19	09:22	10:27	22:32	22:54	23:14
-52	08:14	09:19	10:25	22:36	22:56	23:15
-54	08:09	09:16	10:24	22:40	22:58	23:15
-56	08:03	09:12	10:22	22:44	23:01	23:16
-58	07:56	09:08	10:20	22:50	23:04	23:17
-60	07:49	09:03	10:18	22:55	23:07	23:17

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	07:13	07:26	12:07	15:31	03:09	4(17%)
11	07:38	07:50	12:07	16:13	03:52	5(24%)
12	08:02	08:13	12:08	16:56	04:35	6(33%)

January 13, 14 ,15 (Sun., Mon., Tue.)

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	112°11.1	227°41.9	-17°58.7	104°47.7	3°08.7	219°13.1	-21°53.1	188°20.0	-22°21.2
1	127°13.5	242°41.6	-17°59.2	119°48.6	3°09.4	234°15.1	-21°53.1	203°22.2	-22°21.2
2	142°16.0	257°41.3	-17°59.7	134°49.5	3°10.1	249°17.0	-21°53.2	218°24.3	-22°21.1
3	157°18.5	272°41.1	-18°00.2	149°50.5	3°10.8	264°18.9	-21°53.2	233°26.5	-22°21.1
4	172°20.9	287°40.8	-18°00.7	164°51.4	3°11.5	279°20.9	-21°53.3	248°28.6	-22°21.1
5	187°23.4	302°40.5	-18°01.2	179°52.3	3°12.2	294°22.8	-21°53.4	263°30.8	-22°21.1
6	202°25.9	317°40.3	-18°01.7	194°53.2	3°12.9	309°24.7	-21°53.4	278°32.9	-22°21.0
7	217°28.3	332°40.0	-18°02.2	209°54.2	3°13.7	324°26.7	-21°53.5	293°35.1	-22°21.0
8	232°30.8	347°39.7	-18°02.7	224°55.1	3°14.4	339°28.6	-21°53.5	308°37.2	-22°21.0
9	247°33.3	2°39.5	-18°03.2	239°56.0	3°15.1	354°30.5	-21°53.6	323°39.4	-22°20.9
10	262°35.7	17°39.2	-18°03.8	254°56.9	3°15.8	9°32.5	-21°53.6	338°41.5	-22°20.9
11	277°38.2	32°38.9	-18°04.3	269°57.9	3°16.5	24°34.4	-21°53.7	353°43.7	-22°20.9
12	292°40.6	47°38.7	-18°04.8	284°58.8	3°17.2	39°36.3	-21°53.8	8°45.8	-22°20.9
13	307°43.1	62°38.4	-18°05.3	299°59.7	3°17.9	54°38.3	-21°53.8	23°48.0	-22°20.8
14	322°45.6	77°38.1	-18°05.8	315°00.6	3°18.6	69°40.2	-21°53.9	38°50.1	-22°20.8
15	337°48.0	92°37.8	-18°06.3	330°01.6	3°19.3	84°42.2	-21°53.9	53°52.3	-22°20.8
16	352°50.5	107°37.6	-18°06.8	345°02.5	3°20.1	99°44.1	-21°54.0	68°54.4	-22°20.8
17	7°53.0	122°37.3	-18°07.3	0°03.4	3°20.8	114°46.0	-21°54.0	83°56.6	-22°20.7
18	22°55.4	137°37.0	-18°07.8	15°04.4	3°21.5	129°48.0	-21°54.1	98°58.7	-22°20.7
19	37°57.9	152°36.7	-18°08.3	30°05.3	3°22.2	144°49.9	-21°54.2	114°00.9	-22°20.7
20	53°00.4	167°36.5	-18°08.8	45°06.2	3°22.9	159°51.8	-21°54.2	129°03.0	-22°20.7
21	68°02.8	182°36.2	-18°09.3	60°07.1	3°23.6	174°53.8	-21°54.3	144°05.2	-22°20.6
22	83°05.3	197°35.9	-18°09.8	75°08.1	3°24.3	189°55.7	-21°54.3	159°07.3	-22°20.6
23	98°07.7	212°35.6	-18°10.3	90°09.0	3°25.0	204°57.6	-21°54.4	174°09.5	-22°20.6
Mer.pass.:16:28		v-0.3 d-0.5 m-4.2		v0.9 d0.7 m0.7		v1.9 d-0.1 m-1.7		v2.1 d0.0 m0.5	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	113°10.2	227°35.3	-18°10.8	105°09.9	3°25.8	219°59.6	-21°54.5	189°11.6	-22°20.6
1	128°12.7	242°35.1	-18°11.3	120°10.8	3°26.5	235°01.5	-21°54.5	204°13.8	-22°20.5
2	143°15.1	257°34.8	-18°11.8	135°11.8	3°27.2	250°03.4	-21°54.6	219°15.9	-22°20.5
3	158°17.6	272°34.5	-18°12.3	150°12.7	3°27.9	265°05.4	-21°54.6	234°18.1	-22°20.5
4	173°20.1	287°34.2	-18°12.8	165°13.6	3°28.6	280°07.3	-21°54.7	249°20.2	-22°20.5
5	188°22.5	302°33.9	-18°13.3	180°14.5	3°29.3	295°09.2	-21°54.7	264°22.4	-22°20.4
6	203°25.0	317°33.6	-18°13.8	195°15.5	3°30.0	310°11.2	-21°54.8	279°24.5	-22°20.4
7	218°27.5	332°33.3	-18°14.3	210°16.4	3°30.7	325°13.1	-21°54.9	294°26.7	-22°20.4
8	233°29.9	347°33.1	-18°14.8	225°17.3	3°31.4	340°15.1	-21°54.9	309°28.8	-22°20.4
9	248°32.4	2°32.8	-18°15.3	240°18.2	3°32.1	355°17.0	-21°55.0	324°31.0	-22°20.3
10	263°34.9	17°32.5	-18°15.8	255°19.2	3°32.9	10°18.9	-21°55.0	339°33.1	-22°20.3
11	278°37.3	32°32.2	-18°16.2	270°20.1	3°33.6	25°20.9	-21°55.1	354°35.3	-22°20.3
12	293°39.8	47°31.9	-18°16.7	285°21.0	3°34.3	40°22.8	-21°55.1	9°37.4	-22°20.3
13	308°42.2	62°31.6	-18°17.2	300°21.9	3°35.0	55°24.7	-21°55.2	24°39.6	-22°20.2
14	323°44.7	77°31.3	-18°17.7	315°22.9	3°35.7	70°26.7	-21°55.3	39°41.7	-22°20.2
15	338°47.2	92°31.0	-18°18.2	330°23.8	3°36.4	85°28.6	-21°55.3	54°43.9	-22°20.2
16	353°49.6	107°30.7	-18°18.7	345°24.7	3°37.1	100°30.6	-21°55.4	69°46.0	-22°20.2
17	8°52.1	122°30.4	-18°19.2	0°25.6	3°37.8	115°32.5	-21°55.4	84°48.2	-22°20.1
18	23°54.6	137°30.1	-18°19.7	15°26.6	3°38.5	130°34.4	-21°55.5	99°50.3	-22°20.1
19	38°57.0	152°29.8	-18°20.2	30°27.5	3°39.3	145°36.4	-21°55.5	114°52.5	-22°20.1
20	53°59.5	167°29.5	-18°20.7	45°28.4	3°40.0	160°38.3	-21°55.6	129°54.6	-22°20.1
21	69°02.0	182°29.2	-18°21.2	60°29.3	3°40.7	175°40.2	-21°55.6	144°56.8	-22°20.0
22	84°04.4	197°28.9	-18°21.7	75°30.3	3°41.4	190°42.2	-21°55.7	159°58.9	-22°20.0
23	99°06.9	212°28.6	-18°22.1	90°31.2	3°42.1	205°44.1	-21°55.8	175°01.1	-22°20.0
Mer.pass.:16:24		v-0.3 d-0.5 m-4.2		v0.9 d0.7 m0.7		v1.9 d-0.1 m-1.7		v2.1 d0.0 m0.5	

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	114°09.4	227°28.3	-18°22.6	105°32.1	3°42.8	220°46.1	-21°55.8	190°03.2	-22°20.0
1	129°11.8	242°28.0	-18°23.1	120°33.0	3°43.5	235°48.0	-21°55.9	205°05.4	-22°19.9
2	144°14.3	257°27.7	-18°23.6	135°34.0	3°44.2	250°49.9	-21°55.9	220°07.5	-22°19.9
3	159°16.7	272°27.4	-18°24.1	150°34.9	3°44.9	265°51.9	-21°56.0	235°09.7	-22°19.9
4	174°19.2	287°27.1	-18°24.6	165°35.8	3°45.6	280°53.8	-21°56.0	250°11.8	-22°19.9
5	189°21.7	302°26.8	-18°25.1	180°36.7	3°46.3	295°55.8	-21°56.1	265°14.0	-22°19.8
6	204°24.1	317°26.5	-18°25.5	195°37.7	3°47.1	310°57.7	-21°56.2	280°16.1	-22°19.8
7	219°26.6	332°26.2	-18°26.0	210°38.6	3°47.8	325°59.6	-21°56.2	295°18.3	-22°19.8
8	234°29.1	347°25.9	-18°26.5	225°39.5	3°48.5	341°01.6	-21°56.3	310°20.4	-22°19.7
9	249°31.5	2°25.6	-18°27.0	240°40.4	3°49.2	356°03.5	-21°56.3	325°22.6	-22°19.7
10	264°34.0	17°25.3	-18°27.5	255°41.3	3°49.9	11°05.5	-21°56.4	340°24.7	-22°19.7
11	279°36.5	32°25.0	-18°28.0	270°42.3	3°50.6	26°07.4	-21°56.4	355°26.9	-22°19.7
12	294°38.9	47°24.7	-18°28.4	285°43.2	3°51.3	41°09.3	-21°56.5	10°29.0	-22°19.6
13	309°41.4	62°24.4	-18°28.9	300°44.1	3°52.0	56°11.3	-21°56.5	25°31.2	-22°19.6
14	324°43.8	77°24.1	-18°29.4	315°45.0	3°52.7	71°13.2	-21°56.6	40°33.3	-22°19.6
15	339°46.3	92°23.7	-18°29.9	330°46.0	3°53.4	86°15.2	-21°56.7	55°35.5	-22°19.6
16	354°48.8	107°23.4	-18°30.4	345°46.9	3°54.1	101°17.1	-21°56.7	70°37.6	-22°19.5
17	9°51.2	122°23.1	-18°30.8	0°47.8	3°54.9	116°19.0	-21°56.8	85°39.8	-22°19.5
18	24°53.7	137°22.8	-18°31.3	15°48.7	3°55.6	131°21.0	-21°56.8	100°41.9	-22°19.5
19	39°56.2	152°22.5	-18°31.8	30°49.7	3°56.3	146°22.9	-21°56.9	115°44.1	-22°19.5
20	54°58.6	167°22.2	-18°32.3	45°50.6	3°57.0	161°24.9	-21°56.9	130°46.2	-22°19.4
21	70°01.1	182°21.9	-18°32.8	60°51.5	3°57.7	176°26.8	-21°57.0	145°48.4	-22°19.4
22	85°03.6	197°21.5	-18°33.2	75°52.4	3°58.4	191°28.7	-21°57.1	160°50.5	-22°19.4
23	100°06.0	212°21.2	-18°33.7	90°53.3	3°59.1	206°30.7	-21°57.1	175°52.7	-22°19.4
Mer.pass.:16:20		v-0.3 d-0.5 m-4.2		v0.9 d0.7 m0.7		v1.9 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°39.7	29°11.8
Ankaa	353°12.1	-42°12.5
Schedar	349°36.3	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°23.9	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°54.4	89°20.8
Akamar	315°15.3	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.6
Sirius	258°29.9	-16°44.5
Adara	255°09.1	-29°00.1
Procyon	244°55.3	5°10.6
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.2
Suhail	222°49.2	-43°30.5
Miaplacidus	221°38.0	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°46.7	61°38.7
Denebola	182°29.6	14°27.9
Gienah	175°48.2	-17°38.7
Acrux	173°04.8	-63°11.9
Gacrux	171°56.5	-57°12.8
Alioth	166°17.3	55°51.2
Spica	158°27.2	-11°15.5
Alcaid	152°55.9	49°13.0
Hadar	148°42.6	-60°27.5
Menkent	148°03.2	-36°27.5
Arcturus	145°52.2	19°05.3
Rigil Kent.	139°46.8	-60°54.4
Zubenelg.	137°01.3	-16°07.0
Kochab	137°20.6	74°04.5
Alphecca	126°08.0	26°39.1
Antares	112°21.8	-26°28.2
Atria	107°20.7	-69°03.3
Sabik	102°08.5	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.2	12°32.9
Etamin	90°44.9	51°29.2
Kaus Aust.	83°39.1	-34°22.4
Vega	80°36.8	38°48.1
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.9	-56°40.4
Deneb	49°29.3	45°21.0
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.8	15°18.4

2019/1/1	SHA	Mer.pass
Venus	115°30.8	08:49
Mars	352°36.6	16:60
Jupiter	107°02.1	09:22
Saturn	76°09.0	11:25

2019/1/1	SHA	Mer.pass
Venus	114°25.1	08:50
Mars	351°59.7	16:58
Jupiter	106°49.4	09:19
Saturn	76°01.4	11:22

2019/1/1	SHA	Mer.pass
Venus	113°19.0	08:50
Mars	351°22.8	16:57
Jupiter	106°36.7	09:16
Saturn	75°53.9	11:18

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°53.8	-21°33.6	102°55.1	15.2	-1°28.0	11.1	55.0
1	192°53.6	-21°33.2	117°29.3	15.2	-1°16.8	11.2	55.0
2	207°53.4	-21°32.7	132°03.4	15.1	-1°05.7	11.2	55.0
3	222°53.1	-21°32.3	146°37.6	15.1	-0°54.5	11.2	55.0
4	237°52.9	-21°31.9	161°11.7	15.1	-0°43.3	11.2	55.1
5	252°52.7	-21°31.5	175°45.8	15.1	-0°32.1	11.2	55.1
6	267°52.4	-21°31.1	190°19.8	15.1	-0°20.9	11.2	55.1
7	282°52.2	-21°30.6	204°53.9	15.0	-0°09.7	11.2	55.1
8	297°51.9	-21°30.2	219°27.9	15.0	0°01.6	11.2	55.2
9	312°51.7	-21°29.8	234°01.9	15.0	0°12.8	11.2	55.2
10	327°51.5	-21°29.4	248°35.8	15.0	0°24.1	11.3	55.2
11	342°51.2	-21°28.9	263°09.8	14.9	0°35.3	11.3	55.2
12	357°51.0	-21°28.5	277°43.7	14.9	0°46.6	11.3	55.3
13	12°50.8	-21°28.1	292°17.5	14.9	0°57.9	11.3	55.3
14	27°50.5	-21°27.7	306°51.4	14.8	1°09.1	11.3	55.3
15	42°50.3	-21°27.2	321°25.2	14.8	1°20.4	11.3	55.3
16	57°50.1	-21°26.8	335°59.0	14.8	1°31.7	11.3	55.4
17	72°49.8	-21°26.4	350°32.8	14.7	1°43.0	11.3	55.4
18	87°49.6	-21°26.0	5°06.5	14.7	1°54.3	11.3	55.4
19	102°49.4	-21°25.5	19°40.2	14.7	2°05.6	11.3	55.5
20	117°49.1	-21°25.1	34°13.8	14.6	2°16.9	11.3	55.5
21	132°48.9	-21°24.7	48°47.4	14.6	2°28.2	11.3	55.5
22	147°48.7	-21°24.2	63°21.0	14.6	2°39.5	11.3	55.5
23	162°48.4	-21°23.8	77°54.6	14.5	2°50.8	11.3	55.6
	SD.=16.3	d=0.4			S.D.=15.0		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°48.2	-21°23.4	92°28.1	14.5	3°02.1	11.3	55.6
1	192°48.0	-21°22.9	107°01.5	14.4	3°13.4	11.3	55.6
2	207°47.7	-21°22.5	121°34.9	14.4	3°24.8	11.3	55.7
3	222°47.5	-21°22.1	136°08.3	14.4	3°36.1	11.3	55.7
4	237°47.3	-21°21.6	150°41.6	14.3	3°47.4	11.3	55.7
5	252°47.1	-21°21.2	165°14.9	14.3	3°58.6	11.3	55.8
6	267°46.8	-21°20.7	179°48.2	14.2	4°09.9	11.3	55.8
7	282°46.6	-21°20.3	194°21.4	14.2	4°21.2	11.3	55.8
8	297°46.4	-21°19.9	208°54.5	14.1	4°32.5	11.3	55.8
9	312°46.1	-21°19.4	223°27.6	14.1	4°43.8	11.3	55.9
10	327°45.9	-21°19.0	238°00.7	14.0	4°55.0	11.3	55.9
11	342°45.7	-21°18.5	252°33.7	14.0	5°06.3	11.2	55.9
12	357°45.5	-21°18.1	267°06.6	13.9	5°17.5	11.2	56.0
13	12°45.2	-21°17.7	281°39.5	13.9	5°28.8	11.2	56.0
14	27°45.0	-21°17.2	296°12.4	13.8	5°40.0	11.2	56.0
15	42°44.8	-21°16.8	310°45.2	13.8	5°51.2	11.2	56.1
16	57°44.5	-21°16.3	325°17.9	13.7	6°02.4	11.2	56.1
17	72°44.3	-21°15.9	339°50.6	13.7	6°13.6	11.2	56.1
18	87°44.1	-21°15.4	354°23.2	13.6	6°24.8	11.2	56.2
19	102°43.9	-21°15.0	8°55.8	13.5	6°35.9	11.1	56.2
20	117°43.6	-21°14.5	23°28.3	13.5	6°47.0	11.1	56.2
21	132°43.4	-21°14.1	38°00.7	13.4	6°58.2	11.1	56.3
22	147°43.2	-21°13.6	52°33.1	13.4	7°09.3	11.1	56.3
23	162°43.0	-21°13.2	67°05.4	13.3	7°20.4	11.1	56.3
	SD.=16.3	d=0.4			S.D.=15.2		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°42.7	-21°12.7	81°37.7	13.2	7°31.4	11.1	56.4
1	192°42.5	-21°12.3	96°09.9	13.2	7°42.5	11.0	56.4
2	207°42.3	-21°11.8	110°42.0	13.1	7°53.5	11.0	56.4
3	222°42.1	-21°11.4	125°14.1	13.0	8°04.5	11.0	56.5
4	237°41.8	-21°10.9	139°46.1	13.0	8°15.5	11.0	56.5
5	252°41.6	-21°10.5	154°18.0	12.9	8°26.4	10.9	56.6
6	267°41.4	-21°10.0	168°49.9	12.8	8°37.4	10.9	56.6
7	282°41.2	-21°09.6	183°21.7	12.8	8°48.3	10.9	56.6
8	297°41.0	-21°09.1	197°53.4	12.7	8°59.1	10.9	56.7
9	312°40.7	-21°08.7	212°25.0	12.6	9°10.0	10.8	56.7
10	327°40.5	-21°08.2	226°56.6	12.5	9°20.8	10.8	56.7
11	342°40.3	-21°07.7	241°28.1	12.5	9°31.6	10.8	56.8
12	357°40.1	-21°07.3	255°59.6	12.4	9°42.4	10.7	56.8
13	12°39.8	-21°06.8	270°30.9	12.3	9°53.1	10.7	56.8
14	27°39.6	-21°06.4	285°02.2	12.2	10°03.8	10.7	56.9
15	42°39.4	-21°05.9	299°33.4	12.2	10°14.4	10.6	56.9
16	57°39.2	-21°05.4	314°04.5	12.1	10°25.1	10.6	57.0
17	72°39.0	-21°05.0	328°35.5	12.0	10°35.6	10.6	57.0
18	87°38.8	-21°04.5	343°06.5	11.9	10°46.2	10.5	57.0
19	102°38.5	-21°04.0	357°37.4	11.8	10°56.7	10.5	57.1
20	117°38.3	-21°03.6	12°08.2	11.8	11°07.2	10.5	57.1
21	132°38.1	-21°03.1	26°38.9	11.7	11°17.6	10.4	57.2
22	147°37.9	-21°02.7	41°09.5	11.6	11°28.0	10.4	57.2
23	162°37.7	-21°02.2	55°40.1	11.5	11°38.3	10.3	57.2
	SD.=16.3	d=0.5			S.D.=15.4		

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
72	08:04	09:57	–:–	–:–	14:22	16:15
70	07:48	09:21	–:–	–:–	14:57	16:30
68	07:36	08:56	10:39	13:40	15:22	16:43
66	07:26	08:37	09:57	14:22	15:42	16:53
64	07:17	08:21	09:28	14:50	15:58	17:02
62	07:09	08:08	09:07	15:12	16:11	17:10
60	07:02	07:56	08:50	15:29	16:22	17:16
58	06:56	07:47	08:35	15:43	16:32	17:22
56	06:50	07:38	08:23	15:56	16:41	17:28
54	06:45	07:30	08:12	16:07	16:48	17:33
52	06:41	07:23	08:02	16:16	16:55	17:38
50	06:36	07:17	07:54	16:25	17:02	17:42
45	06:26	07:03	07:35	16:43	17:16	17:52
40	06:17	06:51	07:20	16:58	17:28	18:01
35	06:09	06:40	07:08	17:10	17:38	18:09
30	06:02	06:31	06:57	17:21	17:47	18:17
20	05:47	06:14	06:38	17:40	18:04	18:31
10	05:33	05:59	06:21	17:57	18:19	18:45
0	05:17	05:43	06:05	18:13	18:35	19:01
-10	05:00	05:27	05:49	18:28	18:51	19:18
-20	04:40	05:08	05:32	18:45	19:10	19:38
-30	04:13	04:46	05:12	19:05	19:32	20:04
-35	03:56	04:32	05:01	19:17	19:46	20:21
-40	03:36	04:16	04:47	19:30	20:02	20:42
-45	03:09	03:55	04:31	19:46	20:22	21:08
-50	02:31	03:29	04:11	20:06	20:48	21:45
-52	02:10	03:17	04:02	20:15	21:00	22:06
-54	01:42	03:01	03:51	20:26	21:15	22:33
-56	00:55	02:44	03:39	20:38	21:33	23:17
-58	–:–	02:21	03:25	20:52	21:55	–:–
-60	–:–	01:51	03:08	21:08	22:24	–:–

Lat.	Moonrise			Moonset		
	Sun	Mon	Tue	Sun	Mon	Tue
72	11:21	11:07	10:52	–:–	00:28	02:18
70	11:22	11:14	11:06	–:–	00:24	02:06
68	11:23	11:20	11:17	–:–	00:20	01:56
66	11:23	11:25	11:27	–:–	00:17	01:48
64	11:24	11:29	11:35	–:–	00:15	01:41
62	11:24	11:32	11:42	–:–	00:13	01:35
60	11:24	11:35	11:48	–:–	00:11	01:30
58	11:25	11:38	11:53	–:–	00:09	01:26
56	11:25	11:41	11:58	–:–	00:08	01:22
54	11:25	11:43	12:02	–:–	00:06	01:18
52	11:25	11:45	12:06	–:–	00:05	01:15
50	11:26	11:47	12:10	–:–	00:04	01:12
45	11:26	11:51	12:18	–:–	00:02	01:06
40	11:26	11:54	12:24	23:60	–:–	01:01
35	11:27	11:57	12:30	23:58	–:–	00:56
30	11:27	11:60	12:35	23:57	–:–	00:52
20	11:28	12:04	12:43	23:54	–:–	00:46
10	11:28	12:09	12:51	23:52	–:–	00:40
0	11:29	12:12	12:58	23:49	–:–	00:34
-10	11:29	12:16	13:06	23:47	–:–	00:28
-20	11:30	12:20	13:14	23:45	–:–	00:23
-30	11:30	12:25	13:22	23:42	–:–	00:16
-35	11:31	12:28	13:28	23:41	–:–	00:12
-40	11:31	12:31	13:34	23:39	–:–	00:08
-45	11:32	12:35	13:41	23:37	–:–	00:03
-50	11:32	12:39	13:49	23:35	23:56	–:–
-52	11:32	12:41	13:53	23:34	23:54	–:–
-54	11:33	12:44	13:57	23:32	23:51	–:–
-56	11:33	12:46	14:02	23:31	23:47	–:–
-58	11:34	12:49	14:07	23:30	23:44	–:–
-60	11:34	12:52	14:13	23:28	23:39	23:53

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	08:25	08:36	12:08	17:38	05:17	7(42%)
14	08:47	08:58	12:08	18:23	06:00	8(52%)
15	09:09	09:20	12:09	19:09	06:46	9(62%)

January 16, 17 ,18 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	115°08.5	227°20.9	-18°34.2	105°54.3	3°59.8	221°32.6	-21°57.2	190°54.8	-22°19.3
1	130°11.0	242°20.6	-18°34.7	120°55.2	4°00.5	236°34.6	-21°57.2	205°57.0	-22°19.3
2	145°13.4	257°20.3	-18°35.1	135°56.1	4°01.2	251°36.5	-21°57.3	220°59.1	-22°19.3
3	160°15.9	272°19.9	-18°35.6	150°57.0	4°01.9	266°38.4	-21°57.3	236°01.3	-22°19.3
4	175°18.3	287°19.6	-18°36.1	165°58.0	4°02.6	281°40.4	-21°57.4	251°03.4	-22°19.2
5	190°20.8	302°19.3	-18°36.6	180°58.9	4°03.4	296°42.3	-21°57.4	266°05.6	-22°19.2
6	205°23.3	317°19.0	-18°37.0	195°59.8	4°04.1	311°44.3	-21°57.5	281°07.7	-22°19.2
7	220°25.7	332°18.7	-18°37.5	211°00.7	4°04.8	326°46.2	-21°57.5	296°09.9	-22°19.2
8	235°28.2	347°18.3	-18°38.0	226°01.6	4°05.5	341°48.2	-21°57.6	311°12.0	-22°19.1
9	250°30.7	2°18.0	-18°38.4	241°02.6	4°06.2	356°50.1	-21°57.7	326°14.2	-22°19.1
10	265°33.1	17°17.7	-18°38.9	256°03.5	4°06.9	11°52.0	-21°57.7	341°16.3	-22°19.1
11	280°35.6	32°17.4	-18°39.4	271°04.4	4°07.6	26°54.0	-21°57.8	356°18.5	-22°19.0
12	295°38.1	47°17.0	-18°39.9	286°05.3	4°08.3	41°55.9	-21°57.8	11°20.6	-22°19.0
13	310°40.5	62°16.7	-18°40.3	301°06.3	4°09.0	56°57.9	-21°57.9	26°22.8	-22°19.0
14	325°43.0	77°16.4	-18°40.8	316°07.2	4°09.7	71°59.8	-21°57.9	41°24.9	-22°19.0
15	340°45.5	92°16.0	-18°41.3	331°08.1	4°10.4	87°01.8	-21°58.0	56°27.1	-22°18.9
16	355°47.9	107°15.7	-18°41.7	346°09.0	4°11.1	102°03.7	-21°58.0	71°29.2	-22°18.9
17	10°50.4	122°15.4	-18°42.2	1°09.9	4°11.8	117°05.6	-21°58.1	86°31.4	-22°18.9
18	25°52.8	137°15.0	-18°42.7	16°10.9	4°12.5	132°07.6	-21°58.2	101°33.6	-22°18.9
19	40°55.3	152°14.7	-18°43.1	31°11.8	4°13.3	147°09.5	-21°58.2	116°35.7	-22°18.8
20	55°57.8	167°14.4	-18°43.6	46°12.7	4°14.0	162°11.5	-21°58.3	131°37.9	-22°18.8
21	71°00.2	182°14.0	-18°44.1	61°13.6	4°14.7	177°13.4	-21°58.3	146°40.0	-22°18.8
22	86°02.7	197°13.7	-18°44.5	76°14.6	4°15.4	192°15.4	-21°58.4	161°42.2	-22°18.8
23	101°05.2	212°13.4	-18°45.0	91°15.5	4°16.1	207°17.3	-21°58.4	176°44.3	-22°18.7
Mer.pass.:16:16		v-0.3 d-0.5 m-4.2		v0.9 d0.7 m0.7		v1.9 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	116°07.6	227°13.0	-18°45.5	106°16.4	4°16.8	222°19.3	-21°58.5	191°46.5	-22°18.7
1	131°10.1	242°12.7	-18°45.9	121°17.3	4°17.5	237°21.2	-21°58.5	206°48.6	-22°18.7
2	146°12.6	257°12.4	-18°46.4	136°18.2	4°18.2	252°23.1	-21°58.6	221°50.8	-22°18.7
3	161°15.0	272°12.0	-18°46.8	151°19.2	4°18.9	267°25.1	-21°58.6	236°52.9	-22°18.6
4	176°17.5	287°11.7	-18°47.3	166°20.1	4°19.6	282°27.0	-21°58.7	251°55.1	-22°18.6
5	191°19.9	302°11.3	-18°47.8	181°21.0	4°20.3	297°29.0	-21°58.7	266°57.2	-22°18.6
6	206°22.4	317°11.0	-18°48.2	196°21.9	4°21.0	312°30.9	-21°58.8	281°59.4	-22°18.6
7	221°24.9	332°10.7	-18°48.7	211°22.8	4°21.7	327°32.9	-21°58.9	297°01.5	-22°18.5
8	236°27.3	347°10.3	-18°49.1	226°23.8	4°22.4	342°34.8	-21°58.9	312°03.7	-22°18.5
9	251°29.8	2°10.0	-18°49.6	241°24.7	4°23.1	357°36.8	-21°59.0	327°05.8	-22°18.5
10	266°32.3	17°09.6	-18°50.1	256°25.6	4°23.9	12°38.7	-21°59.0	342°08.0	-22°18.4
11	281°34.7	32°09.3	-18°50.5	271°26.5	4°24.6	27°40.7	-21°59.1	357°10.1	-22°18.4
12	296°37.2	47°08.9	-18°51.0	286°27.4	4°25.3	42°42.6	-21°59.1	12°12.3	-22°18.4
13	311°39.7	62°08.6	-18°51.4	301°28.4	4°26.0	57°44.5	-21°59.2	27°14.4	-22°18.4
14	326°42.1	77°08.2	-18°51.9	316°29.3	4°26.7	72°46.5	-21°59.2	42°16.6	-22°18.3
15	341°44.6	92°07.9	-18°52.3	331°30.2	4°27.4	87°48.4	-21°59.3	57°18.7	-22°18.3
16	356°47.1	107°07.5	-18°52.8	346°31.1	4°28.1	102°50.4	-21°59.3	72°20.9	-22°18.3
17	11°49.5	122°07.2	-18°53.2	1°32.0	4°28.8	117°52.3	-21°59.4	87°23.0	-22°18.3
18	26°52.0	137°06.8	-18°53.7	16°33.0	4°29.5	132°54.3	-21°59.4	102°25.2	-22°18.2
19	41°54.4	152°06.5	-18°54.1	31°33.9	4°30.2	147°56.2	-21°59.5	117°27.3	-22°18.2
20	56°56.9	167°06.1	-18°54.6	46°34.8	4°30.9	162°58.2	-21°59.6	132°29.5	-22°18.2
21	71°59.4	182°05.8	-18°55.0	61°35.7	4°31.6	178°00.1	-21°59.6	147°31.7	-22°18.2
22	87°01.8	197°05.4	-18°55.5	76°36.6	4°32.3	193°02.1	-21°59.7	162°33.8	-22°18.1
23	102°04.3	212°05.1	-18°55.9	91°37.6	4°33.0	208°04.0	-21°59.7	177°36.0	-22°18.1
Mer.pass.:16:12		v-0.3 d-0.5 m-4.2		v0.9 d0.7 m0.7		v1.9 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	117°06.8	227°04.7	-18°56.4	106°38.5	4°33.7	223°06.0	-21°59.8	192°38.1	-22°18.1
1	132°09.2	242°04.4	-18°56.8	121°39.4	4°34.4	238°07.9	-21°59.8	207°40.3	-22°18.1
2	147°11.7	257°04.0	-18°57.3	136°40.3	4°35.1	253°09.9	-21°59.9	222°42.4	-22°18.0
3	162°14.2	272°03.7	-18°57.7	151°41.2	4°35.8	268°11.8	-21°59.9	237°44.6	-22°18.0
4	177°16.6	287°03.3	-18°58.2	166°42.2	4°36.5	283°13.8	-21°60.0	252°46.7	-22°18.0
5	192°19.1	302°02.9	-18°58.6	181°43.1	4°37.3	298°15.7	-22°00.0	267°48.9	-22°17.9
6	207°21.6	317°02.6	-18°59.1	196°44.0	4°38.0	313°17.7	-22°00.1	282°51.0	-22°17.9
7	222°24.0	332°02.2	-18°59.5	211°44.9	4°38.7	328°19.6	-22°00.1	297°53.2	-22°17.9
8	237°26.5	347°01.9	-18°60.0	226°45.8	4°39.4	343°21.6	-22°00.2	312°55.3	-22°17.9
9	252°28.9	2°01.5	-19°00.4	241°46.8	4°40.1	358°23.5	-22°00.2	327°57.5	-22°17.8
10	267°31.4	17°01.1	-19°00.9	256°47.7	4°40.8	13°25.4	-22°00.3	342°59.6	-22°17.8
11	282°33.9	32°00.8	-19°01.3	271°48.6	4°41.5	28°27.4	-22°00.4	358°01.8	-22°17.8
12	297°36.3	47°00.4	-19°01.7	286°49.5	4°42.2	43°29.3	-22°00.4	13°03.9	-22°17.8
13	312°38.8	62°00.1	-19°02.2	301°50.4	4°42.9	58°31.3	-22°00.5	28°06.1	-22°17.7
14	327°41.3	76°59.7	-19°02.6	316°51.3	4°43.6	73°33.2	-22°00.5	43°08.2	-22°17.7
15	342°43.7	91°59.3	-19°03.1	331°52.3	4°44.3	88°35.2	-22°00.6	58°10.4	-22°17.7
16	357°46.2	106°59.0	-19°03.5	346°53.2	4°45.0	103°37.1	-22°00.6	73°12.6	-22°17.7
17	12°48.7	121°58.6	-19°04.0	1°54.1	4°45.7	118°39.1	-22°00.7	88°14.7	-22°17.6
18	27°51.1	136°58.2	-19°04.4	16°55.0	4°46.4	133°41.0	-22°00.7	103°16.9	-22°17.6
19	42°53.6	151°57.9	-19°04.8	31°55.9	4°47.1	148°43.0	-22°00.8	118°19.0	-22°17.6
20	57°56.1	166°57.5	-19°05.3	46°56.9	4°47.8	163°44.9	-22°00.8	133°21.2	-22°17.6
21	72°58.5	181°57.1	-19°05.7	61°57.8	4°48.5	178°46.9	-22°00.9	148°23.3	-22°17.5
22	88°01.0	196°56.7	-19°06.1	76°58.7	4°49.2	193°48.8	-22°00.9	163°25.5	-22°17.5
23	103°03.4	211°56.4	-19°06.6	91°59.6	4°49.9	208°50.8	-22°01.0	178°27.6	-22°17.5
Mer.pass.:16:08		v-0.4 d-0.4 m-4.2		v0.9 d0.7 m0.7		v1.9 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.8
Ankaa	353°12.1	-42°12.5
Schedar	349°36.3	56°38.6
Diphda	348°52.0	-17°53.2
Achernar	335°24.0	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°55.6	89°20.9
Akamar	315°15.3	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.6
Sirius	258°29.9	-16°44.6
Adara	255°09.1	-29°00.1
Procyon	244°55.3	5°10.6
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.2
Suhail	222°49.2	-43°30.5
Miaplacidus	221°38.0	-69°47.6
Alphard	217°52.0	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°46.6	61°38.7
Denebola	182°29.6	14°27.9
Gienah	175°48.2	-17°38.7
Acrux	173°04.8	-63°11.9
Gacrux	171°56.5	-57°12.8
Alioth	166°17.3	55°51.2
Spica	158°27.2	-11°15.5
Alcaid	152°55.9	49°13.0
Hadar	148°42.5	-60°27.5
Menkent	148°03.1	-36°27.5
Arcturus	145°52.2	19°05.3
Rigil Kent.	139°46.7	-60°54.4
Zubenelg.	137°01.3	-16°07.0
Kochab	137°20.5	74°04.5
Alphecca	126°08.0	26°39.0
Antares	112°21.8	-26°28.2
Atria	107°20.6	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.2	12°32.9
Etamin	90°44.9	51°29.2
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.8	38°48.1
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.9	-56°40.4
Deneb	49°29.3	45°21.0
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.8	15°18.4

2019/1/1	**SHA**	**Mer.pass**
Venus	112°12.4	08:51
Mars	350°45.8	16:55
Jupiter	106°24.1	09:13
Saturn	75°46.3	11:15

2019/1/1	**SHA**	**Mer.pass**
Venus	111°05.4	08:51
Mars	350°08.8	16:54
Jupiter	106°11.6	09:10
Saturn	75°38.8	11:11

2019/1/1	**SHA**	**Mer.pass**
Venus	109°58.0	08:52
Mars	349°31.7	16:52
Jupiter	105°59.2	09:06
Saturn	75°31.3	11:08

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°37.4	-21°01.7	70°10.6	11.4	11°48.6	10.3	57.3
1	192°37.2	-21°01.2	84°40.9	11.3	11°58.9	10.2	57.3
2	207°37.0	-21°00.8	99°11.2	11.3	12°09.1	10.2	57.3
3	222°36.8	-21°00.3	113°41.4	11.2	12°19.3	10.1	57.4
4	237°36.6	-20°59.8	128°11.6	11.1	12°29.4	10.1	57.4
5	252°36.4	-20°59.4	142°41.6	11.0	12°39.5	10.0	57.5
6	267°36.1	-20°58.9	157°11.5	10.9	12°49.5	10.0	57.5
7	282°35.9	-20°58.4	171°41.4	10.8	12°59.4	9.9	57.5
8	297°35.7	-20°58.0	186°11.1	10.7	13°09.3	9.9	57.6
9	312°35.5	-20°57.5	200°40.8	10.6	13°19.2	9.8	57.6
10	327°35.3	-20°57.0	215°10.4	10.5	13°29.0	9.8	57.7
11	342°35.1	-20°56.5	229°39.9	10.4	13°38.7	9.7	57.7
12	357°34.9	-20°56.1	244°09.2	10.3	13°48.4	9.7	57.7
13	12°34.6	-20°55.6	258°38.5	10.2	13°58.0	9.6	57.8
14	27°34.4	-20°55.1	273°07.7	10.2	14°07.6	9.5	57.8
15	42°34.2	-20°54.6	287°36.8	10.1	14°17.1	9.5	57.9
16	57°34.0	-20°54.1	302°05.8	10.0	14°26.5	9.4	57.9
17	72°33.8	-20°53.7	316°34.8	9.9	14°35.9	9.3	58.0
18	87°33.6	-20°53.2	331°03.6	9.8	14°45.2	9.3	58.0
19	102°33.4	-20°52.7	345°32.3	9.7	14°54.4	9.2	58.0
20	117°33.2	-20°52.2	0°00.9	9.6	15°03.6	9.1	58.1
21	132°33.0	-20°51.7	14°29.4	9.5	15°12.7	9.1	58.1
22	147°32.7	-20°51.3	28°57.8	9.4	15°21.7	9.0	58.2
23	162°32.5	-20°50.8	43°26.2	9.3	15°30.7	8.9	58.2
	SD.=16.3	d=0.5			S.D.=15.6		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°32.3	-20°50.3	57°54.4	9.2	15°39.5	8.8	58.2
1	192°32.1	-20°49.8	72°22.5	9.1	15°48.3	8.8	58.3
2	207°31.9	-20°49.3	86°50.5	9.0	15°57.1	8.7	58.3
3	222°31.7	-20°48.8	101°18.4	8.9	16°05.7	8.6	58.4
4	237°31.5	-20°48.3	115°46.3	8.8	16°14.3	8.5	58.4
5	252°31.3	-20°47.9	130°14.0	8.7	16°22.8	8.4	58.4
6	267°31.1	-20°47.4	144°41.6	8.6	16°31.2	8.4	58.5
7	282°30.9	-20°46.9	159°09.1	8.5	16°39.5	8.3	58.5
8	297°30.7	-20°46.4	173°36.5	8.4	16°47.7	8.2	58.6
9	312°30.4	-20°45.9	188°03.8	8.3	16°55.9	8.1	58.6
10	327°30.2	-20°45.4	202°31.0	8.2	17°03.9	8.0	58.6
11	342°30.0	-20°44.9	216°58.1	8.1	17°11.9	7.9	58.7
12	357°29.8	-20°44.4	231°25.1	7.9	17°19.8	7.8	58.7
13	12°29.6	-20°43.9	245°52.0	7.8	17°27.5	7.7	58.8
14	27°29.4	-20°43.4	260°18.8	7.7	17°35.2	7.6	58.8
15	42°29.2	-20°42.9	274°45.5	7.6	17°42.8	7.5	58.9
16	57°29.0	-20°42.4	289°12.1	7.5	17°50.3	7.4	58.9
17	72°28.8	-20°42.0	303°38.6	7.4	17°57.7	7.3	58.9
18	87°28.6	-20°41.5	318°05.0	7.3	18°05.0	7.2	59.0
19	102°28.4	-20°41.0	332°31.3	7.2	18°12.2	7.1	59.0
20	117°28.2	-20°40.5	346°57.4	7.1	18°19.3	7.0	59.1
21	132°28.0	-20°40.0	1°23.5	7.0	18°26.3	6.9	59.1
22	147°27.8	-20°39.5	15°49.5	6.9	18°33.1	6.8	59.1
23	162°27.6	-20°39.0	30°15.4	6.8	18°39.9	6.7	59.2
	SD.=16.3	d=0.5			S.D.=15.9		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°27.4	-20°38.5	44°41.2	6.7	18°46.6	6.6	59.2
1	192°27.2	-20°38.0	59°06.9	6.6	18°53.1	6.5	59.3
2	207°27.0	-20°37.5	73°32.4	6.5	18°59.6	6.4	59.3
3	222°26.8	-20°37.0	87°57.9	6.4	19°05.9	6.3	59.3
4	237°26.6	-20°36.5	102°23.3	6.3	19°12.1	6.2	59.4
5	252°26.4	-20°36.0	116°48.6	6.2	19°18.2	6.0	59.4
6	267°26.2	-20°35.4	131°13.8	6.1	19°24.2	5.9	59.4
7	282°26.0	-20°34.9	145°38.9	6.0	19°30.1	5.8	59.5
8	297°25.8	-20°34.4	160°03.9	5.9	19°35.8	5.7	59.5
9	312°25.6	-20°33.9	174°28.8	5.9	19°41.4	5.6	59.6
10	327°25.4	-20°33.4	188°53.6	5.8	19°46.9	5.4	59.6
11	342°25.2	-20°32.9	203°18.3	5.7	19°52.3	5.3	59.6
12	357°25.0	-20°32.4	217°42.9	5.6	19°57.5	5.2	59.7
13	12°24.8	-20°31.9	232°07.5	5.5	20°02.7	5.1	59.7
14	27°24.6	-20°31.4	246°31.9	5.4	20°07.6	4.9	59.7
15	42°24.4	-20°30.9	260°56.2	5.3	20°12.5	4.8	59.8
16	57°24.2	-20°30.4	275°20.5	5.2	20°17.2	4.7	59.8
17	72°24.0	-20°29.9	289°44.7	5.1	20°21.8	4.5	59.9
18	87°23.8	-20°29.3	304°08.8	5.0	20°26.3	4.4	59.9
19	102°23.6	-20°28.8	318°32.8	5.0	20°30.6	4.3	59.9
20	117°23.4	-20°28.3	332°56.7	4.9	20°34.8	4.1	60.0
21	132°23.2	-20°27.8	347°20.5	4.8	20°38.9	4.0	60.0
22	147°23.0	-20°27.3	1°44.3	4.7	20°42.8	3.8	60.0
23	162°22.8	-20°26.8	16°08.0	4.6	20°46.6	3.7	60.1
	SD.=16.3	d=0.5			S.D.=16.2		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:56	09:44	–:–	–:–	14:37	16:25
70	07:42	09:13	11:47	12:34	15:08	16:39
68	07:31	08:49	10:25	13:56	15:32	16:50
66	07:21	08:31	09:48	14:33	15:50	16:60
64	07:13	08:16	09:21	14:59	16:05	17:08
62	07:06	08:03	09:01	15:19	16:17	17:15
60	06:59	07:53	08:45	15:36	16:28	17:22
58	06:53	07:43	08:31	15:49	16:37	17:27
56	06:48	07:35	08:19	16:01	16:46	17:33
54	06:43	07:28	08:09	16:12	16:53	17:37
52	06:39	07:21	07:60	16:21	16:60	17:42
50	06:34	07:15	07:51	16:29	17:06	17:46
45	06:25	07:01	07:34	16:47	17:19	17:56
40	06:16	06:50	07:19	17:01	17:31	18:04
35	06:09	06:40	07:07	17:13	17:41	18:12
30	06:01	06:31	06:56	17:24	17:50	18:19
20	05:47	06:14	06:38	17:42	18:06	18:33
10	05:33	05:59	06:22	17:58	18:21	18:47
0	05:19	05:44	06:06	18:14	18:36	19:01
-10	05:02	05:28	05:51	18:29	18:52	19:18
-20	04:42	05:10	05:34	18:46	19:09	19:38
-30	04:16	04:48	05:15	19:05	19:31	20:03
-35	03:60	04:35	05:04	19:16	19:45	20:20
-40	03:40	04:19	04:51	19:29	20:00	20:39
-45	03:14	03:60	04:35	19:44	20:20	21:05
-50	02:38	03:35	04:16	20:03	20:44	21:41
-52	02:18	03:22	04:07	20:12	20:57	22:00
-54	01:52	03:08	03:57	20:22	21:11	22:25
-56	01:13	02:51	03:45	20:34	21:28	23:02
-58	–:–	02:30	03:31	20:47	21:48	–:–
-60	–:–	02:02	03:16	21:03	22:15	–:–

		Moonrise			**Moonset**	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	10:31	09:52	–:–	04:18	06:45	–:–
70	10:56	10:43	10:10	03:55	05:56	08:27
68	11:15	11:15	11:17	03:37	05:25	07:20
66	11:31	11:38	11:53	03:23	05:03	06:45
64	11:44	11:57	12:19	03:11	04:45	06:19
62	11:55	12:12	12:40	03:01	04:30	05:59
60	12:04	12:25	12:56	02:53	04:18	05:43
58	12:12	12:37	13:10	02:45	04:07	05:29
56	12:19	12:46	13:23	02:39	03:58	05:17
54	12:26	12:55	13:33	02:33	03:50	05:07
52	12:32	13:03	13:43	02:28	03:43	04:58
50	12:37	13:10	13:51	02:23	03:36	04:50
45	12:48	13:25	14:09	02:13	03:22	04:33
40	12:58	13:37	14:24	02:04	03:11	04:18
35	13:06	13:48	14:37	01:57	03:01	04:06
30	13:13	13:57	14:48	01:51	02:52	03:56
20	13:26	14:13	15:06	01:40	02:37	03:38
10	13:37	14:28	15:23	01:30	02:25	03:22
0	13:48	14:41	15:38	01:21	02:12	03:08
-10	13:58	14:54	15:54	01:13	02:01	02:53
-20	14:09	15:09	16:11	01:03	01:48	02:38
-30	14:22	15:25	16:30	00:52	01:33	02:20
-35	14:30	15:35	16:41	00:46	01:25	02:10
-40	14:39	15:46	16:54	00:39	01:15	01:58
-45	14:49	15:59	17:10	00:31	01:04	01:44
-50	15:01	16:15	17:29	00:21	00:50	01:27
-52	15:07	16:23	17:38	00:17	00:44	01:19
-54	15:13	16:31	17:48	00:12	00:37	01:10
-56	15:20	16:41	17:59	00:06	00:30	01:00
-58	15:28	16:51	18:12	00:00	00:21	00:49
-60	15:38	17:04	18:27	–:–	00:11	00:36

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	09:30	09:41	12:09	19:59	07:34	10(72%)
17	09:51	10:01	12:10	20:54	08:26	11(82%)
18	10:11	10:20	12:10	21:52	09:22	12(90%)

January 19, 20 ,21 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	118°05.9	226°56.0	-19°07.0	107°00.5	4°50.6	223°52.8	-22°01.0	193°29.8	-22°17.4
1	133°08.4	241°55.6	-19°07.4	122°01.4	4°51.3	238°54.7	-22°01.1	208°31.9	-22°17.4
2	148°10.8	256°55.3	-19°07.9	137°02.4	4°52.0	253°56.7	-22°01.1	223°34.1	-22°17.4
3	163°13.3	271°54.9	-19°08.3	152°03.3	4°52.7	268°58.6	-22°01.2	238°36.2	-22°17.4
4	178°15.8	286°54.5	-19°08.8	167°04.2	4°53.4	284°00.6	-22°01.2	253°38.4	-22°17.3
5	193°18.2	301°54.1	-19°09.2	182°05.1	4°54.1	299°02.5	-22°01.3	268°40.5	-22°17.3
6	208°20.7	316°53.8	-19°09.6	197°06.0	4°54.8	314°04.5	-22°01.4	283°42.7	-22°17.3
7	223°23.2	331°53.4	-19°10.0	212°06.9	4°55.5	329°06.4	-22°01.4	298°44.9	-22°17.3
8	238°25.6	346°53.0	-19°10.5	227°07.9	4°56.2	344°08.4	-22°01.5	313°47.0	-22°17.2
9	253°28.1	1°52.6	-19°10.9	242°08.8	4°56.9	359°10.3	-22°01.5	328°49.2	-22°17.2
10	268°30.6	16°52.2	-19°11.3	257°09.7	4°57.6	14°12.3	-22°01.6	343°51.3	-22°17.2
11	283°33.0	31°51.9	-19°11.8	272°10.6	4°58.4	29°14.2	-22°01.6	358°53.5	-22°17.2
12	298°35.5	46°51.5	-19°12.2	287°11.5	4°59.1	44°16.2	-22°01.7	13°55.6	-22°17.1
13	313°37.9	61°51.1	-19°12.6	302°12.5	4°59.8	59°18.1	-22°01.7	28°57.8	-22°17.1
14	328°40.4	76°50.7	-19°13.0	317°13.4	5°00.5	74°20.1	-22°01.8	43°59.9	-22°17.1
15	343°42.9	91°50.3	-19°13.5	332°14.3	5°01.2	89°22.0	-22°01.8	59°02.1	-22°17.0
16	358°45.3	106°50.0	-19°13.9	347°15.2	5°01.9	104°24.0	-22°01.9	74°04.2	-22°17.0
17	13°47.8	121°49.6	-19°14.3	2°16.1	5°02.6	119°25.9	-22°01.9	89°06.4	-22°17.0
18	28°50.3	136°49.2	-19°14.8	17°17.0	5°03.3	134°27.9	-22°02.0	104°08.5	-22°17.0
19	43°52.7	151°48.8	-19°15.2	32°18.0	5°04.0	149°29.8	-22°02.0	119°10.7	-22°16.9
20	58°55.2	166°48.4	-19°15.6	47°18.9	5°04.7	164°31.8	-22°02.1	134°12.9	-22°16.9
21	73°57.7	181°48.0	-19°16.0	62°19.8	5°05.4	179°33.7	-22°02.1	149°15.0	-22°16.9
22	89°00.1	196°47.6	-19°16.4	77°20.7	5°06.1	194°35.7	-22°02.2	164°17.2	-22°16.9
23	104°02.6	211°47.3	-19°16.9	92°21.6	5°06.8	209°37.7	-22°02.2	179°19.3	-22°16.8
Mer.pass.:16:04		v-0.4 d-0.4 m-4.2		v0.9 d0.7 m0.7		v2.0 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	119°05.1	226°46.9	-19°17.3	107°22.5	5°07.5	224°39.6	-22°02.3	194°21.5	-22°16.8
1	134°07.5	241°46.5	-19°17.7	122°23.4	5°08.2	239°41.6	-22°02.3	209°23.6	-22°16.8
2	149°10.0	256°46.1	-19°18.1	137°24.4	5°08.9	254°43.5	-22°02.4	224°25.8	-22°16.8
3	164°12.4	271°45.7	-19°18.5	152°25.3	5°09.6	269°45.5	-22°02.4	239°27.9	-22°16.7
4	179°14.9	286°45.3	-19°19.0	167°26.2	5°10.3	284°47.4	-22°02.5	254°30.1	-22°16.7
5	194°17.4	301°44.9	-19°19.4	182°27.1	5°11.0	299°49.4	-22°02.5	269°32.2	-22°16.7
6	209°19.8	316°44.5	-19°19.8	197°28.0	5°11.7	314°51.3	-22°02.6	284°34.4	-22°16.6
7	224°22.3	331°44.1	-19°20.2	212°28.9	5°12.4	329°53.3	-22°02.6	299°36.6	-22°16.6
8	239°24.8	346°43.7	-19°20.6	227°29.9	5°13.1	344°55.2	-22°02.7	314°38.7	-22°16.6
9	254°27.2	1°43.3	-19°21.0	242°30.8	5°13.8	359°57.2	-22°02.7	329°40.9	-22°16.6
10	269°29.7	16°42.9	-19°21.5	257°31.7	5°14.5	14°59.2	-22°02.8	344°43.0	-22°16.5
11	284°32.2	31°42.5	-19°21.9	272°32.6	5°15.2	30°01.1	-22°02.8	359°45.2	-22°16.5
12	299°34.6	46°42.1	-19°22.3	287°33.5	5°15.9	45°03.1	-22°02.9	14°47.3	-22°16.5
13	314°37.1	61°41.8	-19°22.7	302°34.4	5°16.6	60°05.0	-22°02.9	29°49.5	-22°16.5
14	329°39.5	76°41.4	-19°23.1	317°35.4	5°17.3	75°07.0	-22°03.0	44°51.6	-22°16.4
15	344°42.0	91°41.0	-19°23.5	332°36.3	5°18.0	90°08.9	-22°03.0	59°53.8	-22°16.4
16	359°44.5	106°40.6	-19°23.9	347°37.2	5°18.7	105°10.9	-22°03.1	74°55.9	-22°16.4
17	14°46.9	121°40.2	-19°24.3	2°38.1	5°19.4	120°12.9	-22°03.1	89°58.1	-22°16.4
18	29°49.4	136°39.8	-19°24.8	17°39.0	5°20.1	135°14.8	-22°03.2	105°00.3	-22°16.3
19	44°51.9	151°39.3	-19°25.2	32°39.9	5°20.8	150°16.8	-22°03.2	120°02.4	-22°16.3
20	59°54.3	166°38.9	-19°25.6	47°40.8	5°21.5	165°18.7	-22°03.3	135°04.6	-22°16.3
21	74°56.8	181°38.5	-19°26.0	62°41.8	5°22.2	180°20.7	-22°03.3	150°06.7	-22°16.2
22	89°59.3	196°38.1	-19°26.4	77°42.7	5°22.9	195°22.6	-22°03.4	165°08.9	-22°16.2
23	105°01.7	211°37.7	-19°26.8	92°43.6	5°23.6	210°24.6	-22°03.4	180°11.0	-22°16.2
Mer.pass.:16:01		v-0.4 d-0.4 m-4.2		v0.9 d0.7 m0.7		v2.0 d-0.1 m-1.7		v2.2 d0.0 m0.5	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	120°04.2	226°37.3	-19°27.2	107°44.5	5°24.3	225°26.6	-22°03.5	195°13.2	-22°16.2
1	135°06.7	241°36.9	-19°27.6	122°45.4	5°25.0	240°28.5	-22°03.5	210°15.3	-22°16.1
2	150°09.1	256°36.5	-19°28.0	137°46.3	5°25.7	255°30.5	-22°03.6	225°17.5	-22°16.1
3	165°11.6	271°36.1	-19°28.4	152°47.2	5°26.4	270°32.4	-22°03.6	240°19.7	-22°16.1
4	180°14.0	286°35.7	-19°28.8	167°48.2	5°27.1	285°34.4	-22°03.7	255°21.8	-22°16.1
5	195°16.5	301°35.3	-19°29.2	182°49.1	5°27.8	300°36.3	-22°03.7	270°24.0	-22°16.0
6	210°19.0	316°34.9	-19°29.6	197°50.0	5°28.5	315°38.3	-22°03.8	285°26.1	-22°16.0
7	225°21.4	331°34.5	-19°30.0	212°50.9	5°29.2	330°40.3	-22°03.8	300°28.3	-22°16.0
8	240°23.9	346°34.1	-19°30.4	227°51.8	5°29.9	345°42.2	-22°03.9	315°30.4	-22°16.0
9	255°26.4	1°33.6	-19°30.8	242°52.7	5°30.6	0°44.2	-22°03.9	330°32.6	-22°15.9
10	270°28.8	16°33.2	-19°31.2	257°53.6	5°31.3	15°46.1	-22°04.0	345°34.7	-22°15.9
11	285°31.3	31°32.8	-19°31.6	272°54.6	5°32.0	30°48.1	-22°04.0	0°36.9	-22°15.9
12	300°33.8	46°32.4	-19°32.0	287°55.5	5°32.7	45°50.1	-22°04.1	15°39.1	-22°15.8
13	315°36.2	61°32.0	-19°32.4	302°56.4	5°33.4	60°52.0	-22°04.1	30°41.2	-22°15.8
14	330°38.7	76°31.6	-19°32.8	317°57.3	5°34.1	75°54.0	-22°04.2	45°43.4	-22°15.8
15	345°41.2	91°31.2	-19°33.2	332°58.2	5°34.8	90°55.9	-22°04.2	60°45.5	-22°15.8
16	0°43.6	106°30.7	-19°33.6	347°59.1	5°35.5	105°57.9	-22°04.3	75°47.7	-22°15.7
17	15°46.1	121°30.3	-19°34.0	3°00.0	5°36.2	120°59.8	-22°04.3	90°49.8	-22°15.7
18	30°48.5	136°29.9	-19°34.4	18°01.0	5°36.9	136°01.8	-22°04.4	105°52.0	-22°15.7
19	45°51.0	151°29.5	-19°34.8	33°01.9	5°37.5	151°03.8	-22°04.4	120°54.1	-22°15.7
20	60°53.5	166°29.1	-19°35.2	48°02.8	5°38.2	166°05.7	-22°04.5	135°56.3	-22°15.6
21	75°55.9	181°28.7	-19°35.6	63°03.7	5°38.9	181°07.7	-22°04.5	150°58.5	-22°15.6
22	90°58.4	196°28.2	-19°36.0	78°04.6	5°39.6	196°09.7	-22°04.6	166°00.6	-22°15.6
23	106°00.9	211°27.8	-19°36.4	93°05.5	5°40.3	211°11.6	-22°04.6	181°02.8	-22°15.5
Mer.pass.:15:57		v-0.4 d-0.4 m-4.2		v0.9 d0.7 m0.8		v2.0 d-0.1 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°39.7	29°11.8
Ankaa	353°12.1	-42°12.5
Schedar	349°36.3	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.0	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°56.6	89°20.9
Akamar	315°15.3	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.6	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°53.9	-52°42.6
Sirius	258°29.9	-16°44.6
Adara	255°09.1	-29°00.1
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.3
Suhail	222°49.2	-43°30.6
Miaplacidus	221°38.0	-69°47.6
Alphard	217°52.0	-8°44.5
Regulus	207°39.1	11°52.3
Dubhe	193°46.6	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.7
Acrux	173°04.8	-63°11.9
Gacrux	171°56.4	-57°12.8
Alioth	166°17.3	55°51.2
Spica	158°27.2	-11°15.5
Alcaid	152°55.9	49°12.9
Hadar	148°42.5	-60°27.5
Menkent	148°03.1	-36°27.5
Arcturus	145°52.1	19°05.3
Rigil Kent.	139°46.7	-60°54.4
Zubenelg.	137°01.3	-16°07.0
Kochab	137°20.5	74°04.4
Alphecca	126°08.0	26°39.0
Antares	112°21.8	-26°28.2
Atria	107°20.6	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.2	12°32.9
Etamin	90°44.8	51°29.1
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.8	38°48.0
Nunki	75°54.0	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.8	-56°40.4
Deneb	49°29.3	45°20.9
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°49.9	28°11.2
Markab	13°34.8	15°18.4

2019/1/1	SHA	Mer.pass
Venus	108°50.1	08:52
Mars	348°54.6	16:51
Jupiter	105°46.8	09:03
Saturn	75°23.9	11:04

2019/1/2	SHA	Mer.pass
Venus	107°41.8	08:53
Mars	348°17.5	16:49
Jupiter	105°34.6	09:00
Saturn	75°16.4	11:01

2019/1/2	SHA	Mer.pass
Venus	106°33.1	08:54
Mars	347°40.3	16:48
Jupiter	105°22.4	08:57
Saturn	75°09.0	10:58

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	*ν*	**Dec**	**d**	**HP**
0	177°22.6	-20°26.2	30°31.6	4.6	20°50.2	3.6	60.1
1	192°22.4	-20°25.7	44°55.1	4.5	20°53.7	3.4	60.1
2	207°22.2	-20°25.2	59°18.5	4.4	20°57.0	3.3	60.2
3	222°22.0	-20°24.7	73°41.9	4.3	21°00.3	3.1	60.2
4	237°21.8	-20°24.2	88°05.2	4.3	21°03.3	3.0	60.2
5	252°21.6	-20°23.7	102°28.4	4.2	21°06.2	2.8	60.3
6	267°21.5	-20°23.1	116°51.6	4.1	21°09.0	2.7	60.3
7	282°21.3	-20°22.6	131°14.7	4.1	21°11.6	2.5	60.3
8	297°21.1	-20°22.1	145°37.7	4.0	21°14.1	2.4	60.4
9	312°20.9	-20°21.6	160°00.6	3.9	21°16.4	2.2	60.4
10	327°20.7	-20°21.0	174°23.5	3.9	21°18.6	2.1	60.4
11	342°20.5	-20°20.5	188°46.4	3.8	21°20.6	1.9	60.5
12	357°20.3	-20°20.0	203°09.2	3.7	21°22.4	1.8	60.5
13	12°20.1	-20°19.5	217°31.9	3.7	21°24.1	1.6	60.5
14	27°19.9	-20°18.9	231°54.5	3.6	21°25.7	1.5	60.5
15	42°19.7	-20°18.4	246°17.1	3.6	21°27.1	1.3	60.6
16	57°19.5	-20°17.9	260°39.7	3.5	21°28.3	1.2	60.6
17	72°19.4	-20°17.4	275°02.2	3.5	21°29.4	1.0	60.6
18	87°19.2	-20°16.8	289°24.7	3.4	21°30.4	0.8	60.7
19	102°19.0	-20°16.3	303°47.1	3.4	21°31.1	0.7	60.7
20	117°18.8	-20°15.8	318°09.5	3.4	21°31.7	0.5	60.7
21	132°18.6	-20°15.2	332°31.8	3.3	21°32.2	0.4	60.7
22	147°18.4	-20°14.7	346°54.1	3.3	21°32.5	0.2	60.8
23	162°18.2	-20°14.2	1°16.3	3.2	21°32.6	0.1	60.8
	SD.=16.3	d=0.5			S.D.=16.4		

Sun	**GHA**	**Dec**	**GHA**	*ν*	**Dec**	**d**	**HP**
0	177°18.0	-20°13.6	15°38.6	3.2	21°32.6	-0.1	60.8
1	192°17.9	-20°13.1	30°00.8	3.2	21°32.4	-0.3	60.8
2	207°17.7	-20°12.6	44°22.9	3.1	21°32.0	-0.4	60.9
3	222°17.5	-20°12.0	58°45.0	3.1	21°31.5	-0.6	60.9
4	237°17.3	-20°11.5	73°07.1	3.1	21°30.8	-0.8	60.9
5	252°17.1	-20°11.0	87°29.2	3.1	21°30.0	-0.9	60.9
6	267°16.9	-20°10.4	101°51.3	3.0	21°29.0	-1.1	60.9
7	282°16.7	-20°09.9	116°13.3	3.0	21°27.8	-1.2	61.0
8	297°16.6	-20°09.4	130°35.3	3.0	21°26.5	-1.4	61.0
9	312°16.4	-20°08.8	144°57.3	3.0	21°25.0	-1.6	61.0
10	327°16.2	-20°08.3	159°19.3	3.0	21°23.4	-1.7	61.0
11	342°16.0	-20°07.7	173°41.3	3.0	21°21.5	-1.9	61.0
12	357°15.8	-20°07.2	188°03.3	3.0	21°19.6	-2.1	61.1
13	12°15.6	-20°06.7	202°25.2	3.0	21°17.4	-2.2	61.1
14	27°15.5	-20°06.1	216°47.2	3.0	21°15.1	-2.4	61.1
15	42°15.3	-20°05.6	231°09.2	3.0	21°12.6	-2.5	61.1
16	57°15.1	-20°05.0	245°31.1	3.0	21°10.0	-2.7	61.1
17	72°14.9	-20°04.5	259°53.1	3.0	21°07.2	-2.9	61.1
18	87°14.7	-20°03.9	274°15.0	3.0	21°04.3	-3.0	61.2
19	102°14.5	-20°03.4	288°37.0	3.0	21°01.2	-3.2	61.2
20	117°14.4	-20°02.9	302°59.0	3.0	20°57.9	-3.4	61.2
21	132°14.2	-20°02.3	317°21.0	3.0	20°54.4	-3.5	61.2
22	147°14.0	-20°01.8	331°43.0	3.0	20°50.8	-3.7	61.2
23	162°13.8	-20°01.2	346°05.0	3.0	20°47.1	-3.8	61.2
	SD.=16.3	d=0.5			S.D.=16.6		

Mon	**GHA**	**Dec**	**GHA**	*ν*	**Dec**	**d**	**HP**
0	177°13.6	-20°00.7	0°27.1	3.0	20°43.2	-4.0	61.2
1	192°13.5	-20°00.1	14°49.1	3.1	20°39.1	-4.2	61.3
2	207°13.3	-19°59.6	29°11.2	3.1	20°34.9	-4.3	61.3
3	222°13.1	-19°59.0	43°33.3	3.1	20°30.5	-4.5	61.3
4	237°12.9	-19°58.5	57°55.4	3.1	20°25.9	-4.6	61.3
5	252°12.8	-19°57.9	72°17.6	3.2	20°21.2	-4.8	61.3
6	267°12.6	-19°57.4	86°39.8	3.2	20°16.3	-4.9	61.3
7	282°12.4	-19°56.8	101°02.0	3.2	20°11.3	-5.1	61.3
8	297°12.2	-19°56.3	115°24.3	3.3	20°06.2	-5.2	61.3
9	312°12.1	-19°55.7	129°46.6	3.3	20°00.8	-5.4	61.3
10	327°11.9	-19°55.1	144°08.9	3.3	19°55.4	-5.5	61.3
11	342°11.7	-19°54.6	158°31.2	3.4	19°49.7	-5.7	61.3
12	357°11.5	-19°54.0	172°53.7	3.4	19°44.0	-5.8	61.3
13	12°11.3	-19°53.5	187°16.1	3.5	19°38.0	-6.0	61.3
14	27°11.2	-19°52.9	201°38.6	3.5	19°32.0	-6.1	61.3
15	42°11.0	-19°52.4	216°01.2	3.6	19°25.7	-6.3	61.4
16	57°10.8	-19°51.8	230°23.7	3.6	19°19.4	-6.4	61.4
17	72°10.7	-19°51.2	244°46.4	3.7	19°12.9	-6.6	61.4
18	87°10.5	-19°50.7	259°09.1	3.7	19°06.2	-6.7	61.4
19	102°10.3	-19°50.1	273°31.8	3.8	18°59.4	-6.9	61.4
20	117°10.1	-19°49.6	287°54.6	3.8	18°52.5	-7.0	61.4
21	132°10.0	-19°49.0	302°17.5	3.9	18°45.4	-7.1	61.4
22	147°09.8	-19°48.4	316°40.4	3.9	18°38.2	-7.3	61.4
23	162°09.6	-19°47.9	331°03.4	4.0	18°30.8	-7.4	61.4
	SD.=16.3	d=0.5			S.D.=16.7		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:49	09:32	–:–	–:–	14:51	16:34
70	07:36	09:03	11:07	13:16	15:20	16:47
68	07:25	08:42	10:11	14:12	15:41	16:58
66	07:16	08:25	09:38	14:45	15:58	17:07
64	07:08	08:11	09:14	15:09	16:12	17:14
62	07:01	07:59	08:55	15:27	16:24	17:21
60	06:55	07:49	08:40	15:43	16:34	17:27
58	06:50	07:40	08:27	15:56	16:43	17:33
56	06:45	07:32	08:15	16:07	16:51	17:37
54	06:40	07:25	08:05	16:17	16:58	17:42
52	06:36	07:18	07:56	16:26	17:04	17:46
50	06:32	07:12	07:49	16:34	17:10	17:50
45	06:23	06:59	07:32	16:51	17:23	17:59
40	06:15	06:48	07:18	17:04	17:34	18:07
35	06:08	06:39	07:06	17:16	17:43	18:14
30	06:01	06:30	06:56	17:26	17:52	18:21
20	05:47	06:14	06:38	17:44	18:08	18:35
10	05:34	05:60	06:22	17:60	18:22	18:48
0	05:20	05:45	06:07	18:15	18:37	19:02
-10	05:04	05:30	05:52	18:29	18:52	19:18
-20	04:44	05:12	05:36	18:45	19:09	19:37
-30	04:19	04:51	05:18	19:04	19:30	20:02
-35	04:03	04:38	05:07	19:15	19:43	20:18
-40	03:44	04:23	04:54	19:27	19:58	20:37
-45	03:19	04:04	04:39	19:42	20:17	21:02
-50	02:45	03:40	04:21	20:00	20:41	21:36
-52	02:26	03:28	04:12	20:09	20:52	21:54
-54	02:03	03:14	04:02	20:19	21:06	22:17
-56	01:29	02:58	03:51	20:30	21:22	22:49
-58	–:–	02:39	03:38	20:42	21:41	–:–
-60	–:–	02:13	03:23	20:57	22:06	–:–

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	13:30	–:–	–:–	11:39
68	11:31	12:37	14:35	09:12	10:19	10:34
66	12:26	13:31	15:10	08:18	09:24	09:58
64	12:59	14:04	15:35	07:45	08:51	09:32
62	13:23	14:29	15:55	07:21	08:27	09:12
60	13:42	14:48	16:11	07:02	08:07	08:55
58	13:58	15:04	16:25	06:46	07:51	08:41
56	14:12	15:17	16:37	06:33	07:38	08:29
54	14:24	15:29	16:47	06:21	07:26	08:18
52	14:34	15:39	16:56	06:10	07:15	08:09
50	14:44	15:49	17:04	06:01	07:06	08:01
45	15:04	16:08	17:22	05:42	06:46	07:43
40	15:20	16:24	17:36	05:26	06:30	07:28
35	15:33	16:38	17:48	05:12	06:16	07:15
30	15:45	16:49	17:58	05:01	06:04	07:04
20	16:05	17:09	18:16	04:41	05:44	06:45
10	16:23	17:27	18:32	04:23	05:26	06:29
0	16:40	17:43	18:46	04:07	05:10	06:13
-10	16:56	17:59	19:01	03:51	04:53	05:58
-20	17:14	18:17	19:16	03:34	04:35	05:41
-30	17:35	18:37	19:34	03:14	04:15	05:21
-35	17:47	18:48	19:44	03:02	04:03	05:10
-40	18:01	19:02	19:56	02:49	03:49	04:57
-45	18:17	19:18	20:10	02:33	03:32	04:42
-50	18:37	19:37	20:27	02:13	03:12	04:23
-52	18:47	19:46	20:34	02:04	03:02	04:14
-54	18:58	19:57	20:43	01:54	02:52	04:04
-56	19:10	20:08	20:53	01:42	02:39	03:52
-58	19:24	20:22	21:04	01:29	02:25	03:39
-60	19:41	20:38	21:17	01:13	02:08	03:24

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	10:30	10:39	12:10	22:54	10:23	13(96%)
20	10:48	10:57	12:10	23:58	11:26	14(99%)
21	11:06	11:14	12:11	01:00	12:29	15(100%)

January 22, 23 ,24 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	121°03.3	226°27.4	-19°36.7	108°06.4	5°41.0	226°13.6	-22°04.7	196°04.9	-22°15.5
1	136°05.8	241°27.0	-19°37.1	123°07.3	5°41.7	241°15.5	-22°04.7	211°07.1	-22°15.5
2	151°08.3	256°26.5	-19°37.5	138°08.3	5°42.4	256°17.5	-22°04.8	226°09.2	-22°15.5
3	166°10.7	271°26.1	-19°37.9	153°09.2	5°43.1	271°19.5	-22°04.8	241°11.4	-22°15.4
4	181°13.2	286°25.7	-19°38.3	168°10.1	5°43.8	286°21.4	-22°04.9	256°13.6	-22°15.4
5	196°15.7	301°25.3	-19°38.7	183°11.0	5°44.5	301°23.4	-22°04.9	271°15.7	-22°15.4
6	211°18.1	316°24.8	-19°39.1	198°11.9	5°45.2	316°25.3	-22°05.0	286°17.9	-22°15.4
7	226°20.6	331°24.4	-19°39.5	213°12.8	5°45.9	331°27.3	-22°05.0	301°20.0	-22°15.3
8	241°23.0	346°24.0	-19°39.8	228°13.7	5°46.6	346°29.3	-22°05.1	316°22.2	-22°15.3
9	256°25.5	1°23.6	-19°40.2	243°14.6	5°47.3	1°31.2	-22°05.1	331°24.3	-22°15.3
10	271°28.0	16°23.1	-19°40.6	258°15.6	5°48.0	16°33.2	-22°05.2	346°26.5	-22°15.2
11	286°30.4	31°22.7	-19°41.0	273°16.5	5°48.7	31°35.2	-22°05.2	1°28.7	-22°15.2
12	301°32.9	46°22.3	-19°41.4	288°17.4	5°49.4	46°37.1	-22°05.3	16°30.8	-22°15.2
13	316°35.4	61°21.9	-19°41.8	303°18.3	5°50.1	61°39.1	-22°05.3	31°33.0	-22°15.2
14	331°37.8	76°21.4	-19°42.1	318°19.2	5°50.8	76°41.0	-22°05.4	46°35.1	-22°15.1
15	346°40.3	91°21.0	-19°42.5	333°20.1	5°51.5	91°43.0	-22°05.4	61°37.3	-22°15.1
16	1°42.8	106°20.6	-19°42.9	348°21.0	5°52.2	106°45.0	-22°05.5	76°39.4	-22°15.1
17	16°45.2	121°20.1	-19°43.3	3°21.9	5°52.9	121°46.9	-22°05.5	91°41.6	-22°15.1
18	31°47.7	136°19.7	-19°43.7	18°22.8	5°53.6	136°48.9	-22°05.6	106°43.8	-22°15.0
19	46°50.2	151°19.3	-19°44.0	33°23.8	5°54.3	151°50.9	-22°05.6	121°45.9	-22°15.0
20	61°52.6	166°18.8	-19°44.4	48°24.7	5°55.0	166°52.8	-22°05.7	136°48.1	-22°15.0
21	76°55.1	181°18.4	-19°44.8	63°25.6	5°55.7	181°54.8	-22°05.7	151°50.2	-22°15.0
22	91°57.5	196°17.9	-19°45.2	78°26.5	5°56.3	196°56.7	-22°05.8	166°52.4	-22°14.9
23	107°00.0	211°17.5	-19°45.5	93°27.4	5°57.0	211°58.7	-22°05.8	181°54.5	-22°14.9
Mer.pass.:15:53		v-0.4 d-0.4 m-4.2		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	122°02.5	226°17.1	-19°45.9	108°28.3	5°57.7	227°00.7	-22°05.9	196°56.7	-22°14.9
1	137°04.9	241°16.6	-19°46.3	123°29.2	5°58.4	242°02.6	-22°05.9	211°58.9	-22°14.8
2	152°07.4	256°16.2	-19°46.7	138°30.1	5°59.1	257°04.6	-22°06.0	227°01.0	-22°14.8
3	167°09.9	271°15.8	-19°47.0	153°31.0	5°59.8	272°06.6	-22°06.0	242°03.2	-22°14.8
4	182°12.3	286°15.3	-19°47.4	168°32.0	6°00.5	287°08.5	-22°06.1	257°05.3	-22°14.8
5	197°14.8	301°14.9	-19°47.8	183°32.9	6°01.2	302°10.5	-22°06.1	272°07.5	-22°14.7
6	212°17.3	316°14.4	-19°48.1	198°33.8	6°01.9	317°12.5	-22°06.2	287°09.6	-22°14.7
7	227°19.7	331°14.0	-19°48.5	213°34.7	6°02.6	332°14.4	-22°06.2	302°11.8	-22°14.7
8	242°22.2	346°13.6	-19°48.9	228°35.6	6°03.3	347°16.4	-22°06.2	317°14.0	-22°14.7
9	257°24.6	1°13.1	-19°49.2	243°36.5	6°04.0	2°18.4	-22°06.3	332°16.1	-22°14.6
10	272°27.1	16°12.7	-19°49.6	258°37.4	6°04.7	17°20.3	-22°06.3	347°18.3	-22°14.6
11	287°29.6	31°12.2	-19°50.0	273°38.3	6°05.4	32°22.3	-22°06.4	2°20.4	-22°14.6
12	302°32.0	46°11.8	-19°50.3	288°39.2	6°06.1	47°24.3	-22°06.4	17°22.6	-22°14.5
13	317°34.5	61°11.3	-19°50.7	303°40.2	6°06.8	62°26.2	-22°06.5	32°24.7	-22°14.5
14	332°37.0	76°10.9	-19°51.1	318°41.1	6°07.5	77°28.2	-22°06.5	47°26.9	-22°14.5
15	347°39.4	91°10.4	-19°51.4	333°42.0	6°08.2	92°30.2	-22°06.6	62°29.1	-22°14.5
16	2°41.9	106°10.0	-19°51.8	348°42.9	6°08.8	107°32.1	-22°06.6	77°31.2	-22°14.4
17	17°44.4	121°09.5	-19°52.2	3°43.8	6°09.5	122°34.1	-22°06.7	92°33.4	-22°14.4
18	32°46.8	136°09.1	-19°52.5	18°44.7	6°10.2	137°36.1	-22°06.7	107°35.5	-22°14.4
19	47°49.3	151°08.6	-19°52.9	33°45.6	6°10.9	152°38.0	-22°06.8	122°37.7	-22°14.4
20	62°51.8	166°08.2	-19°53.2	48°46.5	6°11.6	167°40.0	-22°06.8	137°39.9	-22°14.3
21	77°54.2	181°07.7	-19°53.6	63°47.4	6°12.3	182°42.0	-22°06.9	152°42.0	-22°14.3
22	92°56.7	196°07.3	-19°54.0	78°48.3	6°13.0	197°43.9	-22°06.9	167°44.2	-22°14.3
23	107°59.1	211°06.8	-19°54.3	93°49.3	6°13.7	212°45.9	-22°07.0	182°46.3	-22°14.2
Mer.pass.:15:49		v-0.4 d-0.4 m-4.2		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	123°01.6	226°06.4	-19°54.7	108°50.2	6°14.4	227°47.9	-22°07.0	197°48.5	-22°14.2
1	138°04.1	241°05.9	-19°55.0	123°51.1	6°15.1	242°49.8	-22°07.1	212°50.6	-22°14.2
2	153°06.5	256°05.5	-19°55.4	138°52.0	6°15.8	257°51.8	-22°07.1	227°52.8	-22°14.2
3	168°09.0	271°05.0	-19°55.7	153°52.9	6°16.5	272°53.8	-22°07.2	242°55.0	-22°14.1
4	183°11.5	286°04.6	-19°56.1	168°53.8	6°17.2	287°55.7	-22°07.2	257°57.1	-22°14.1
5	198°13.9	301°04.1	-19°56.4	183°54.7	6°17.9	302°57.7	-22°07.2	272°59.3	-22°14.1
6	213°16.4	316°03.6	-19°56.8	198°55.6	6°18.5	317°59.7	-22°07.3	288°01.4	-22°14.1
7	228°18.9	331°03.2	-19°57.1	213°56.5	6°19.2	333°01.6	-22°07.3	303°03.6	-22°14.0
8	243°21.3	346°02.7	-19°57.5	228°57.4	6°19.9	348°03.6	-22°07.4	318°05.8	-22°14.0
9	258°23.8	1°02.3	-19°57.8	243°58.3	6°20.6	3°05.6	-22°07.4	333°07.9	-22°14.0
10	273°26.3	16°01.8	-19°58.2	258°59.2	6°21.3	18°07.5	-22°07.5	348°10.1	-22°13.9
11	288°28.7	31°01.4	-19°58.5	274°00.2	6°22.0	33°09.5	-22°07.5	3°12.2	-22°13.9
12	303°31.2	46°00.9	-19°58.9	289°01.1	6°22.7	48°11.5	-22°07.6	18°14.4	-22°13.9
13	318°33.6	61°00.4	-19°59.2	304°02.0	6°23.4	63°13.5	-22°07.6	33°16.6	-22°13.9
14	333°36.1	75°60.0	-19°59.6	319°02.9	6°24.1	78°15.4	-22°07.7	48°18.7	-22°13.8
15	348°38.6	90°59.5	-19°59.9	334°03.8	6°24.8	93°17.4	-22°07.7	63°20.9	-22°13.8
16	3°41.0	105°59.0	-20°00.3	349°04.7	6°25.5	108°19.4	-22°07.8	78°23.0	-22°13.8
17	18°43.5	120°58.6	-20°00.6	4°05.6	6°26.2	123°21.3	-22°07.8	93°25.2	-22°13.8
18	33°46.0	135°58.1	-20°01.0	19°06.5	6°26.8	138°23.3	-22°07.9	108°27.3	-22°13.7
19	48°48.4	150°57.7	-20°01.3	34°07.4	6°27.5	153°25.3	-22°07.9	123°29.5	-22°13.7
20	63°50.9	165°57.2	-20°01.7	49°08.3	6°28.2	168°27.2	-22°07.9	138°31.7	-22°13.7
21	78°53.4	180°56.7	-20°02.0	64°09.2	6°28.9	183°29.2	-22°08.0	153°33.8	-22°13.6
22	93°55.8	195°56.3	-20°02.3	79°10.1	6°29.6	198°31.2	-22°08.0	168°36.0	-22°13.6
23	108°58.3	210°55.8	-20°02.7	94°11.1	6°30.3	213°33.2	-22°08.1	183°38.1	-22°13.6
Mer.pass.:15:45		v-0.5 d-0.4 m-4.2		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.7
Ankaa	353°12.1	-42°12.5
Schedar	349°36.3	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.0	-57°08.9
Hamal	327°56.4	23°33.1
Polaris	315°58.0	89°20.9
Akamar	315°15.3	-40°14.1
Menkar	314°10.9	4°09.7
Mirfak	308°34.7	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.0
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.0	-52°42.6
Sirius	258°29.9	-16°44.6
Adara	255°09.1	-29°00.1
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.3
Suhail	222°49.2	-43°30.6
Miaplacidus	221°38.0	-69°47.7
Alphard	217°52.0	-8°44.5
Regulus	207°39.1	11°52.3
Dubhe	193°46.5	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.7
Acrux	173°04.7	-63°11.9
Gacrux	171°56.4	-57°12.9
Alioth	166°17.2	55°51.2
Spica	158°27.2	-11°15.5
Alcaid	152°55.8	49°12.9
Hadar	148°42.4	-60°27.5
Menkent	148°03.1	-36°27.5
Arcturus	145°52.1	19°05.3
Rigil Kent.	139°46.6	-60°54.4
Zubenelg.	137°01.3	-16°07.1
Kochab	137°20.4	74°04.4
Alphecca	126°07.9	26°39.0
Antares	112°21.8	-26°28.2
Atria	107°20.5	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.1	-37°06.8
Rasalhague	96°03.2	12°32.8
Etamin	90°44.8	51°29.1
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.8	38°48.0
Nunki	75°53.9	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.8	-56°40.4
Deneb	49°29.3	45°20.9
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.2
Markab	13°34.8	15°18.4

2019/1/2	**SHA**	**Mer.pass**
Venus	105°24.1	08:54
Mars	347°03.1	16:47
Jupiter	105°10.2	08:54
Saturn	75°01.6	10:54

2019/1/2	**SHA**	**Mer.pass**
Venus	104°14.6	08:55
Mars	346°25.8	16:45
Jupiter	104°58.2	08:51
Saturn	74°54.2	10:51

2019/1/2	**SHA**	**Mer.pass**
Venus	103°04.8	08:56
Mars	345°48.5	16:44
Jupiter	104°46.3	08:48
Saturn	74°46.9	10:47

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°09.4	-19°47.3	345°26.4	4.1	18°23.4	-7.6	61.4
1	192°09.3	-19°46.7	359°49.5	4.1	18°15.7	-7.7	61.4
2	207°09.1	-19°46.2	14°12.7	4.2	18°08.0	-7.8	61.3
3	222°08.9	-19°45.6	28°35.9	4.3	18°00.1	-8.0	61.3
4	237°08.8	-19°45.0	42°59.2	4.3	17°52.1	-8.1	61.3
5	252°08.6	-19°44.5	57°22.5	4.4	17°43.9	-8.2	61.3
6	267°08.4	-19°43.9	71°46.0	4.5	17°35.7	-8.3	61.3
7	282°08.3	-19°43.3	86°09.5	4.5	17°27.3	-8.5	61.3
8	297°08.1	-19°42.8	100°33.0	4.6	17°18.7	-8.6	61.3
9	312°07.9	-19°42.2	114°56.6	4.7	17°10.1	-8.7	61.3
10	327°07.8	-19°41.6	129°20.3	4.7	17°01.3	-8.8	61.3
11	342°07.6	-19°41.1	143°44.1	4.8	16°52.4	-8.9	61.3
12	357°07.4	-19°40.5	158°08.0	4.9	16°43.4	-9.1	61.3
13	12°07.2	-19°39.9	172°31.9	5.0	16°34.3	-9.2	61.3
14	27°07.1	-19°39.4	186°55.9	5.0	16°25.1	-9.3	61.3
15	42°06.9	-19°38.8	201°20.0	5.1	16°15.7	-9.4	61.3
16	57°06.8	-19°38.2	215°44.1	5.2	16°06.3	-9.5	61.2
17	72°06.6	-19°37.6	230°08.4	5.3	15°56.7	-9.6	61.2
18	87°06.4	-19°37.1	244°32.7	5.3	15°47.0	-9.7	61.2
19	102°06.3	-19°36.5	258°57.1	5.4	15°37.3	-9.8	61.2
20	117°06.1	-19°35.9	273°21.5	5.5	15°27.4	-9.9	61.2
21	132°05.9	-19°35.3	287°46.1	5.6	15°17.4	-10.0	61.2
22	147°05.8	-19°34.7	302°10.7	5.7	15°07.3	-10.1	61.2
23	162°05.6	-19°34.2	316°35.4	5.7	14°57.1	-10.2	61.2
	SD.=16.3	d=0.6			S.D.=16.7		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°05.4	-19°33.6	331°00.2	5.8	14°46.8	-10.3	61.1
1	192°05.3	-19°33.0	345°25.1	5.9	14°36.4	-10.4	61.1
2	207°05.1	-19°32.4	359°50.0	6.0	14°25.9	-10.5	61.1
3	222°04.9	-19°31.8	14°15.0	6.1	14°15.4	-10.6	61.1
4	237°04.8	-19°31.3	28°40.2	6.2	14°04.7	-10.7	61.1
5	252°04.6	-19°30.7	43°05.3	6.2	13°54.0	-10.8	61.1
6	267°04.5	-19°30.1	57°30.6	6.3	13°43.1	-10.9	61.0
7	282°04.3	-19°29.5	71°56.0	6.4	13°32.2	-11.0	61.0
8	297°04.1	-19°28.9	86°21.4	6.5	13°21.2	-11.0	61.0
9	312°04.0	-19°28.3	100°47.0	6.6	13°10.1	-11.1	61.0
10	327°03.8	-19°27.8	115°12.6	6.6	12°59.0	-11.2	61.0
11	342°03.7	-19°27.2	129°38.3	6.7	12°47.7	-11.3	60.9
12	357°03.5	-19°26.6	144°04.0	6.8	12°36.4	-11.4	60.9
13	12°03.3	-19°26.0	158°29.9	6.9	12°25.0	-11.4	60.9
14	27°03.2	-19°25.4	172°55.8	7.0	12°13.5	-11.5	60.9
15	42°03.0	-19°24.8	187°21.8	7.1	12°02.0	-11.6	60.8
16	57°02.9	-19°24.2	201°47.9	7.1	11°50.4	-11.6	60.8
17	72°02.7	-19°23.6	216°14.1	7.2	11°38.7	-11.7	60.8
18	87°02.6	-19°23.1	230°40.4	7.3	11°27.0	-11.8	60.8
19	102°02.4	-19°22.5	245°06.7	7.4	11°15.2	-11.8	60.8
20	117°02.2	-19°21.9	259°33.2	7.5	11°03.3	-11.9	60.7
21	132°02.1	-19°21.3	273°59.7	7.5	10°51.4	-12.0	60.7
22	147°01.9	-19°20.7	288°26.3	7.6	10°39.4	-12.0	60.7
23	162°01.8	-19°20.1	302°52.9	7.7	10°27.4	-12.1	60.6
	SD.=16.3	d=0.6			S.D.=16.7		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	177°01.6	-19°19.5	317°19.7	7.8	10°15.3	-12.1	60.6
1	192°01.5	-19°18.9	331°46.5	7.9	10°03.1	-12.2	60.6
2	207°01.3	-19°18.3	346°13.4	7.9	9°50.9	-12.2	60.6
3	222°01.1	-19°17.7	0°40.4	8.0	9°38.6	-12.3	60.5
4	237°01.0	-19°17.1	15°07.5	8.1	9°26.3	-12.3	60.5
5	252°00.8	-19°16.5	29°34.6	8.2	9°14.0	-12.4	60.5
6	267°00.7	-19°15.9	44°01.8	8.3	9°01.6	-12.4	60.5
7	282°00.5	-19°15.3	58°29.1	8.3	8°49.2	-12.5	60.4
8	297°00.4	-19°14.7	72°56.5	8.4	8°36.7	-12.5	60.4
9	312°00.2	-19°14.1	87°23.9	8.5	8°24.2	-12.5	60.4
10	327°00.1	-19°13.5	101°51.5	8.6	8°11.6	-12.6	60.3
11	341°59.9	-19°12.9	116°19.1	8.6	7°59.0	-12.6	60.3
12	356°59.8	-19°12.3	130°46.7	8.7	7°46.4	-12.6	60.3
13	11°59.6	-19°11.7	145°14.5	8.8	7°33.7	-12.7	60.2
14	26°59.5	-19°11.1	159°42.3	8.8	7°21.1	-12.7	60.2
15	41°59.3	-19°10.5	174°10.2	8.9	7°08.3	-12.7	60.2
16	56°59.2	-19°09.9	188°38.1	9.0	6°55.6	-12.8	60.2
17	71°59.0	-19°09.3	203°06.1	9.1	6°42.8	-12.8	60.1
18	86°58.9	-19°08.7	217°34.2	9.1	6°30.0	-12.8	60.1
19	101°58.7	-19°08.1	232°02.4	9.2	6°17.2	-12.8	60.1
20	116°58.6	-19°07.5	246°30.6	9.3	6°04.3	-12.9	60.0
21	131°58.4	-19°06.9	260°58.9	9.3	5°51.5	-12.9	60.0
22	146°58.3	-19°06.3	275°27.3	9.4	5°38.6	-12.9	60.0
23	161°58.1	-19°05.7	289°55.7	9.5	5°25.7	-12.9	59.9
	SD.=16.2	d=0.6			S.D.=16.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:40	09:19	–:–	–:–	15:06	16:45
70	07:28	08:53	10:43	13:42	15:31	16:56
68	07:19	08:33	09:58	14:27	15:51	17:06
66	07:10	08:18	09:28	14:56	16:07	17:14
64	07:03	08:05	09:06	15:18	16:20	17:21
62	06:57	07:53	08:49	15:36	16:31	17:27
60	06:51	07:44	08:34	15:50	16:40	17:33
58	06:46	07:35	08:22	16:03	16:49	17:38
56	06:42	07:28	08:11	16:13	16:56	17:42
54	06:37	07:21	08:01	16:23	17:03	17:47
52	06:34	07:15	07:53	16:31	17:09	17:51
50	06:30	07:09	07:45	16:39	17:15	17:54
45	06:21	06:57	07:29	16:55	17:27	18:03
40	06:14	06:47	07:16	17:08	17:37	18:10
35	06:07	06:38	07:05	17:19	17:46	18:17
30	06:00	06:29	06:55	17:29	17:55	18:24
20	05:47	06:14	06:38	17:46	18:09	18:36
10	05:35	06:00	06:22	18:01	18:23	18:49
0	05:21	05:46	06:08	18:15	18:37	19:03
-10	05:05	05:31	05:54	18:30	18:52	19:18
-20	04:46	05:15	05:38	18:45	19:09	19:37
-30	04:22	04:54	05:20	19:03	19:29	20:01
-35	04:07	04:41	05:10	19:13	19:42	20:16
-40	03:48	04:27	04:58	19:25	19:56	20:34
-45	03:24	04:09	04:43	19:40	20:14	20:58
-50	02:52	03:46	04:26	19:57	20:37	21:30
-52	02:34	03:34	04:17	20:05	20:48	21:47
-54	02:13	03:21	04:08	20:14	21:01	22:08
-56	01:44	03:06	03:57	20:25	21:16	22:36
-58	00:52	02:48	03:45	20:37	21:34	23:23
-60	–:–	02:25	03:31	20:51	21:56	–:–

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	15:28	18:06	20:21	11:52	11:15	10:55
70	16:12	18:27	20:30	11:07	10:53	10:43
68	16:41	18:42	20:37	10:37	10:36	10:34
66	17:02	18:55	20:43	10:14	10:22	10:26
64	17:19	19:05	20:48	09:56	10:10	10:20
62	17:33	19:14	20:52	09:41	10:00	10:14
60	17:45	19:22	20:56	09:28	09:52	10:09
58	17:55	19:28	20:59	09:18	09:44	10:05
56	18:04	19:34	21:02	09:08	09:37	10:01
54	18:12	19:39	21:05	08:60	09:31	09:57
52	18:19	19:44	21:07	08:52	09:26	09:54
50	18:26	19:48	21:09	08:45	09:21	09:51
45	18:39	19:58	21:14	08:30	09:10	09:44
40	18:50	20:05	21:18	08:18	09:01	09:39
35	18:60	20:12	21:21	08:08	08:54	09:34
30	19:08	20:17	21:24	07:58	08:47	09:30
20	19:23	20:27	21:29	07:42	08:35	09:23
10	19:35	20:36	21:34	07:28	08:24	09:16
0	19:47	20:44	21:38	07:15	08:14	09:10
-10	19:58	20:52	21:42	07:02	08:04	09:04
-20	20:11	21:01	21:47	06:48	07:54	08:57
-30	20:25	21:11	21:52	06:31	07:41	08:50
-35	20:33	21:16	21:55	06:22	07:34	08:45
-40	20:42	21:23	21:58	06:11	07:26	08:40
-45	20:53	21:30	22:02	05:58	07:16	08:34
-50	21:06	21:39	22:06	05:42	07:05	08:27
-52	21:12	21:43	22:08	05:34	06:59	08:24
-54	21:19	21:47	22:11	05:26	06:53	08:20
-56	21:26	21:52	22:13	05:17	06:46	08:16
-58	21:35	21:58	22:16	05:06	06:39	08:12
-60	21:44	22:04	22:19	04:54	06:30	08:06

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	11:22	11:30	12:11	01:00	13:31	16(97%)
23	11:38	11:46	12:11	02:00	14:29	17(92%)
24	11:54	12:01	12:12	02:57	15:24	18(85%)

January 25, 26 ,27 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	124°00.7	225°55.3	-20°03.0	109°12.0	6°31.0	228°35.1	-22°08.1	198°40.3	-22°13.6
1	139°03.2	240°54.9	-20°03.4	124°12.9	6°31.7	243°37.1	-22°08.2	213°42.5	-22°13.5
2	154°05.7	255°54.4	-20°03.7	139°13.8	6°32.4	258°39.1	-22°08.2	228°44.6	-22°13.5
3	169°08.1	270°53.9	-20°04.0	154°14.7	6°33.1	273°41.0	-22°08.3	243°46.8	-22°13.5
4	184°10.6	285°53.4	-20°04.4	169°15.6	6°33.7	288°43.0	-22°08.3	258°48.9	-22°13.5
5	199°13.1	300°53.0	-20°04.7	184°16.5	6°34.4	303°45.0	-22°08.4	273°51.1	-22°13.4
6	214°15.5	315°52.5	-20°05.0	199°17.4	6°35.1	318°47.0	-22°08.4	288°53.3	-22°13.4
7	229°18.0	330°52.0	-20°05.4	214°18.3	6°35.8	333°48.9	-22°08.5	303°55.4	-22°13.4
8	244°20.5	345°51.6	-20°05.7	229°19.2	6°36.5	348°50.9	-22°08.5	318°57.6	-22°13.3
9	259°22.9	0°51.1	-20°06.0	244°20.1	6°37.2	3°52.9	-22°08.5	333°59.7	-22°13.3
10	274°25.4	15°50.6	-20°06.4	259°21.0	6°37.9	18°54.9	-22°08.6	349°01.9	-22°13.3
11	289°27.9	30°50.1	-20°06.7	274°21.9	6°38.6	33°56.8	-22°08.6	4°04.1	-22°13.3
12	304°30.3	45°49.7	-20°07.0	289°22.8	6°39.3	48°58.8	-22°08.7	19°06.2	-22°13.2
13	319°32.8	60°49.2	-20°07.4	304°23.7	6°40.0	64°00.8	-22°08.7	34°08.4	-22°13.2
14	334°35.2	75°48.7	-20°07.7	319°24.7	6°40.6	79°02.7	-22°08.8	49°10.5	-22°13.2
15	349°37.7	90°48.2	-20°08.0	334°25.6	6°41.3	94°04.7	-22°08.8	64°12.7	-22°13.1
16	4°40.2	105°47.8	-20°08.3	349°26.5	6°42.0	109°06.7	-22°08.9	79°14.9	-22°13.1
17	19°42.6	120°47.3	-20°08.7	4°27.4	6°42.7	124°08.7	-22°08.9	94°17.0	-22°13.1
18	34°45.1	135°46.8	-20°09.0	19°28.3	6°43.4	139°10.6	-22°09.0	109°19.2	-22°13.1
19	49°47.6	150°46.3	-20°09.3	34°29.2	6°44.1	154°12.6	-22°09.0	124°21.4	-22°13.0
20	64°50.0	165°45.8	-20°09.7	49°30.1	6°44.8	169°14.6	-22°09.0	139°23.5	-22°13.0
21	79°52.5	180°45.4	-20°10.0	64°31.0	6°45.5	184°16.6	-22°09.1	154°25.7	-22°13.0
22	94°55.0	195°44.9	-20°10.3	79°31.9	6°46.2	199°18.5	-22°09.1	169°27.8	-22°13.0
23	109°57.4	210°44.4	-20°10.6	94°32.8	6°46.8	214°20.5	-22°09.2	184°30.0	-22°12.9
Mer.pass.:15:41		v-0.5 d-0.3 m-4.2		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	124°59.9	225°43.9	-20°10.9	109°33.7	6°47.5	229°22.5	-22°09.2	199°32.2	-22°12.9
1	140°02.3	240°43.4	-20°11.3	124°34.6	6°48.2	244°24.5	-22°09.3	214°34.3	-22°12.9
2	155°04.8	255°42.9	-20°11.6	139°35.5	6°48.9	259°26.4	-22°09.3	229°36.5	-22°12.8
3	170°07.3	270°42.5	-20°11.9	154°36.4	6°49.6	274°28.4	-22°09.4	244°38.6	-22°12.8
4	185°09.7	285°42.0	-20°12.2	169°37.3	6°50.3	289°30.4	-22°09.4	259°40.8	-22°12.8
5	200°12.2	300°41.5	-20°12.5	184°38.2	6°51.0	304°32.4	-22°09.5	274°43.0	-22°12.8
6	215°14.7	315°41.0	-20°12.9	199°39.1	6°51.7	319°34.3	-22°09.5	289°45.1	-22°12.7
7	230°17.1	330°40.5	-20°13.2	214°40.0	6°52.3	334°36.3	-22°09.5	304°47.3	-22°12.7
8	245°19.6	345°40.0	-20°13.5	229°40.9	6°53.0	349°38.3	-22°09.6	319°49.4	-22°12.7
9	260°22.1	0°39.5	-20°13.8	244°41.9	6°53.7	4°40.3	-22°09.6	334°51.6	-22°12.7
10	275°24.5	15°39.1	-20°14.1	259°42.8	6°54.4	19°42.3	-22°09.7	349°53.8	-22°12.6
11	290°27.0	30°38.6	-20°14.4	274°43.7	6°55.1	34°44.2	-22°09.7	4°55.9	-22°12.6
12	305°29.5	45°38.1	-20°14.7	289°44.6	6°55.8	49°46.2	-22°09.8	19°58.1	-22°12.6
13	320°31.9	60°37.6	-20°15.1	304°45.5	6°56.5	64°48.2	-22°09.8	35°00.3	-22°12.5
14	335°34.4	75°37.1	-20°15.4	319°46.4	6°57.1	79°50.2	-22°09.9	50°02.4	-22°12.5
15	350°36.8	90°36.6	-20°15.7	334°47.3	6°57.8	94°52.1	-22°09.9	65°04.6	-22°12.5
16	5°39.3	105°36.1	-20°16.0	349°48.2	6°58.5	109°54.1	-22°09.9	80°06.7	-22°12.5
17	20°41.8	120°35.6	-20°16.3	4°49.1	6°59.2	124°56.1	-22°10.0	95°08.9	-22°12.4
18	35°44.2	135°35.1	-20°16.6	19°50.0	6°59.9	139°58.1	-22°10.0	110°11.1	-22°12.4
19	50°46.7	150°34.6	-20°16.9	34°50.9	7°00.6	155°00.0	-22°10.1	125°13.2	-22°12.4
20	65°49.2	165°34.1	-20°17.2	49°51.8	7°01.3	170°02.0	-22°10.1	140°15.4	-22°12.3
21	80°51.6	180°33.7	-20°17.5	64°52.7	7°02.0	185°04.0	-22°10.2	155°17.5	-22°12.3
22	95°54.1	195°33.2	-20°17.8	79°53.6	7°02.6	200°06.0	-22°10.2	170°19.7	-22°12.3
23	110°56.6	210°32.7	-20°18.1	94°54.5	7°03.3	215°08.0	-22°10.3	185°21.9	-22°12.3
Mer.pass.:15:37		v-0.5 d-0.3 m-4.1		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	125°59.0	225°32.2	-20°18.4	109°55.4	7°04.0	230°09.9	-22°10.3	200°24.0	-22°12.2
1	141°01.5	240°31.7	-20°18.7	124°56.3	7°04.7	245°11.9	-22°10.3	215°26.2	-22°12.2
2	156°04.0	255°31.2	-20°19.0	139°57.2	7°05.4	260°13.9	-22°10.4	230°28.4	-22°12.2
3	171°06.4	270°30.7	-20°19.3	154°58.1	7°06.1	275°15.9	-22°10.4	245°30.5	-22°12.2
4	186°08.9	285°30.2	-20°19.6	169°59.0	7°06.7	290°17.9	-22°10.5	260°32.7	-22°12.1
5	201°11.3	300°29.7	-20°19.9	184°59.9	7°07.4	305°19.8	-22°10.5	275°34.8	-22°12.1
6	216°13.8	315°29.2	-20°20.2	200°00.8	7°08.1	320°21.8	-22°10.6	290°37.0	-22°12.1
7	231°16.3	330°28.7	-20°20.5	215°01.7	7°08.8	335°23.8	-22°10.6	305°39.2	-22°12.0
8	246°18.7	345°28.2	-20°20.8	230°02.6	7°09.5	350°25.8	-22°10.7	320°41.3	-22°12.0
9	261°21.2	0°27.7	-20°21.1	245°03.5	7°10.2	5°27.8	-22°10.7	335°43.5	-22°12.0
10	276°23.7	15°27.2	-20°21.4	260°04.4	7°10.9	20°29.7	-22°10.7	350°45.7	-22°12.0
11	291°26.1	30°26.7	-20°21.7	275°05.3	7°11.5	35°31.7	-22°10.8	5°47.8	-22°11.9
12	306°28.6	45°26.2	-20°22.0	290°06.2	7°12.2	50°33.7	-22°10.8	20°50.0	-22°11.9
13	321°31.1	60°25.7	-20°22.3	305°07.1	7°12.9	65°35.7	-22°10.9	35°52.1	-22°11.9
14	336°33.5	75°25.2	-20°22.6	320°08.1	7°13.6	80°37.7	-22°10.9	50°54.3	-22°11.8
15	351°36.0	90°24.7	-20°22.9	335°09.0	7°14.3	95°39.6	-22°11.0	65°56.5	-22°11.8
16	6°38.4	105°24.1	-20°23.2	350°09.9	7°15.0	110°41.6	-22°11.0	80°58.6	-22°11.8
17	21°40.9	120°23.6	-20°23.5	5°10.8	7°15.6	125°43.6	-22°11.0	96°00.8	-22°11.8
18	36°43.4	135°23.1	-20°23.8	20°11.7	7°16.3	140°45.6	-22°11.1	111°03.0	-22°11.7
19	51°45.8	150°22.6	-20°24.0	35°12.6	7°17.0	155°47.6	-22°11.1	126°05.1	-22°11.7
20	66°48.3	165°22.1	-20°24.3	50°13.5	7°17.7	170°49.6	-22°11.2	141°07.3	-22°11.7
21	81°50.8	180°21.6	-20°24.6	65°14.4	7°18.4	185°51.5	-22°11.2	156°09.5	-22°11.7
22	96°53.2	195°21.1	-20°24.9	80°15.3	7°19.1	200°53.5	-22°11.3	171°11.6	-22°11.6
23	111°55.7	210°20.6	-20°25.2	95°16.2	7°19.7	215°55.5	-22°11.3	186°13.8	-22°11.6
Mer.pass.:15:33		v-0.5 d-0.3 m-4.1		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.7
Ankaa	353°12.1	-42°12.5
Schedar	349°36.4	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.0	-57°08.9
Hamal	327°56.5	23°33.1
Polaris	315°59.5	89°20.9
Akamar	315°15.3	-40°14.1
Menkar	314°11.0	4°09.7
Mirfak	308°34.7	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.1
Capella	280°28.4	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.0	-52°42.6
Sirius	258°29.9	-16°44.6
Adara	255°09.1	-29°00.1
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.3
Suhail	222°49.2	-43°30.6
Miaplacidus	221°38.0	-69°47.7
Alphard	217°52.0	-8°44.6
Regulus	207°39.1	11°52.3
Dubhe	193°46.5	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.7
Acrux	173°04.7	-63°11.9
Gacrux	171°56.4	-57°12.9
Alioth	166°17.2	55°51.2
Spica	158°27.1	-11°15.5
Alcaid	152°55.8	49°12.9
Hadar	148°42.4	-60°27.5
Menkent	148°03.0	-36°27.5
Arcturus	145°52.1	19°05.3
Rigil Kent.	139°46.6	-60°54.4
Zubenelg.	137°01.2	-16°07.1
Kochab	137°20.3	74°04.4
Alphecca	126°07.9	26°39.0
Antares	112°21.8	-26°28.2
Atria	107°20.5	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.2	12°32.8
Etamin	90°44.8	51°29.1
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.8	38°48.0
Nunki	75°53.9	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.8	-56°40.4
Deneb	49°29.3	45°20.9
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/1/2	**SHA**	**Mer.pass**
Venus	101°54.6	08:57
Mars	345°11.2	16:42
Jupiter	104°34.4	08:45
Saturn	74°39.6	10:44

2019/1/2	**SHA**	**Mer.pass**
Venus	100°44.0	08:57
Mars	344°33.8	16:41
Jupiter	104°22.6	08:41
Saturn	74°32.3	10:40

2019/1/2	**SHA**	**Mer.pass**
Venus	99°33.1	08:58
Mars	343°56.4	16:39
Jupiter	104°10.9	08:38
Saturn	74°25.0	10:37

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°58.0	-19°05.1	304°24.2	9.5	5°12.7	-12.9	59.9
1	191°57.8	-19°04.5	318°52.8	9.6	4°59.8	-12.9	59.9
2	206°57.7	-19°03.8	333°21.4	9.7	4°46.8	-13.0	59.8
3	221°57.5	-19°03.2	347°50.1	9.7	4°33.9	-13.0	59.8
4	236°57.4	-19°02.6	2°18.8	9.8	4°20.9	-13.0	59.8
5	251°57.3	-19°02.0	16°47.6	9.8	4°07.9	-13.0	59.7
6	266°57.1	-19°01.4	31°16.5	9.9	3°54.9	-13.0	59.7
7	281°57.0	-19°00.8	45°45.4	10.0	3°41.9	-13.0	59.7
8	296°56.8	-19°00.2	60°14.4	10.0	3°28.9	-13.0	59.6
9	311°56.7	-18°59.6	74°43.4	10.1	3°15.9	-13.0	59.6
10	326°56.5	-18°58.9	89°12.5	10.1	3°02.9	-13.0	59.5
11	341°56.4	-18°58.3	103°41.7	10.2	2°49.9	-13.0	59.5
12	356°56.2	-18°57.7	118°10.9	10.2	2°36.9	-13.0	59.5
13	11°56.1	-18°57.1	132°40.2	10.3	2°23.9	-13.0	59.4
14	26°56.0	-18°56.5	147°09.5	10.3	2°10.9	-13.0	59.4
15	41°55.8	-18°55.9	161°38.8	10.4	1°57.9	-13.0	59.4
16	56°55.7	-18°55.2	176°08.3	10.4	1°44.9	-13.0	59.3
17	71°55.5	-18°54.6	190°37.7	10.5	1°31.9	-13.0	59.3
18	86°55.4	-18°54.0	205°07.2	10.5	1°18.9	-13.0	59.3
19	101°55.2	-18°53.4	219°36.8	10.6	1°06.0	-13.0	59.2
20	116°55.1	-18°52.8	234°06.4	10.6	0°53.0	-13.0	59.2
21	131°55.0	-18°52.1	248°36.1	10.7	0°40.1	-12.9	59.1
22	146°54.8	-18°51.5	263°05.8	10.7	0°27.1	-12.9	59.1
23	161°54.7	-18°50.9	277°35.5	10.8	0°14.2	-12.9	59.1
	SD.=16.2	d=0.6			S.D.=16.3		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°54.5	-18°50.3	292°05.3	10.8	0°01.3	-12.9	59.0
1	191°54.4	-18°49.6	306°35.2	10.9	-0°11.6	-12.9	59.0
2	206°54.3	-18°49.0	321°05.0	10.9	-0°24.4	-12.9	59.0
3	221°54.1	-18°48.4	335°35.0	10.9	-0°37.3	-12.8	58.9
4	236°54.0	-18°47.8	350°04.9	11.0	-0°50.1	-12.8	58.9
5	251°53.9	-18°47.1	4°34.9	11.0	-1°02.9	-12.8	58.9
6	266°53.7	-18°46.5	19°04.9	11.1	-1°15.7	-12.8	58.8
7	281°53.6	-18°45.9	33°35.0	11.1	-1°28.5	-12.7	58.8
8	296°53.4	-18°45.3	48°05.1	11.1	-1°41.2	-12.7	58.7
9	311°53.3	-18°44.6	62°35.3	11.2	-1°53.9	-12.7	58.7
10	326°53.2	-18°44.0	77°05.5	11.2	-2°06.6	-12.7	58.7
11	341°53.0	-18°43.4	91°35.7	11.2	-2°19.2	-12.6	58.6
12	356°52.9	-18°42.7	106°05.9	11.3	-2°31.9	-12.6	58.6
13	11°52.8	-18°42.1	120°36.2	11.3	-2°44.5	-12.6	58.6
14	26°52.6	-18°41.5	135°06.5	11.3	-2°57.0	-12.5	58.5
15	41°52.5	-18°40.9	149°36.9	11.4	-3°09.6	-12.5	58.5
16	56°52.4	-18°40.2	164°07.2	11.4	-3°22.1	-12.5	58.4
17	71°52.2	-18°39.6	178°37.6	11.4	-3°34.5	-12.4	58.4
18	86°52.1	-18°39.0	193°08.1	11.4	-3°47.0	-12.4	58.4
19	101°52.0	-18°38.3	207°38.5	11.5	-3°59.4	-12.4	58.3
20	116°51.8	-18°37.7	222°09.0	11.5	-4°11.7	-12.3	58.3
21	131°51.7	-18°37.0	236°39.5	11.5	-4°24.0	-12.3	58.3
22	146°51.6	-18°36.4	251°10.0	11.5	-4°36.3	-12.3	58.2
23	161°51.4	-18°35.8	265°40.6	11.6	-4°48.6	-12.2	58.2
	SD.=16.2	d=0.6			S.D.=16.1		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°51.3	-18°35.1	280°11.2	11.6	-5°00.8	-12.2	58.1
1	191°51.2	-18°34.5	294°41.8	11.6	-5°12.9	-12.1	58.1
2	206°51.0	-18°33.9	309°12.4	11.6	-5°25.0	-12.1	58.1
3	221°50.9	-18°33.2	323°43.0	11.7	-5°37.1	-12.1	58.0
4	236°50.8	-18°32.6	338°13.7	11.7	-5°49.2	-12.0	58.0
5	251°50.7	-18°31.9	352°44.4	11.7	-6°01.1	-12.0	58.0
6	266°50.5	-18°31.3	7°15.1	11.7	-6°13.1	-11.9	57.9
7	281°50.4	-18°30.7	21°45.8	11.7	-6°25.0	-11.9	57.9
8	296°50.3	-18°30.0	36°16.5	11.7	-6°36.8	-11.8	57.8
9	311°50.1	-18°29.4	50°47.2	11.8	-6°48.6	-11.8	57.8
10	326°50.0	-18°28.7	65°18.0	11.8	-7°00.3	-11.7	57.8
11	341°49.9	-18°28.1	79°48.8	11.8	-7°12.0	-11.7	57.7
12	356°49.8	-18°27.4	94°19.6	11.8	-7°23.7	-11.6	57.7
13	11°49.6	-18°26.8	108°50.4	11.8	-7°35.3	-11.6	57.7
14	26°49.5	-18°26.1	123°21.2	11.8	-7°46.8	-11.5	57.6
15	41°49.4	-18°25.5	137°52.0	11.8	-7°58.3	-11.5	57.6
16	56°49.3	-18°24.9	152°22.8	11.8	-8°09.7	-11.4	57.6
17	71°49.1	-18°24.2	166°53.7	11.8	-8°21.1	-11.3	57.5
18	86°49.0	-18°23.6	181°24.5	11.9	-8°32.4	-11.3	57.5
19	101°48.9	-18°22.9	195°55.4	11.9	-8°43.7	-11.2	57.5
20	116°48.8	-18°22.3	210°26.2	11.9	-8°54.9	-11.2	57.4
21	131°48.6	-18°21.6	224°57.1	11.9	-9°06.0	-11.1	57.4
22	146°48.5	-18°21.0	239°28.0	11.9	-9°17.1	-11.1	57.3
23	161°48.4	-18°20.3	253°58.9	11.9	-9°28.2	-11.0	57.3
	SD.=16.2	d=0.6			S.D.=15.9		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:31	09:06	11:45	12:41	15:20	16:56
70	07:20	08:43	10:22	14:04	15:43	17:06
68	07:11	08:25	09:44	14:42	16:01	17:15
66	07:04	08:10	09:18	15:08	16:16	17:22
64	06:58	07:58	08:58	15:28	16:28	17:28
62	06:52	07:48	08:42	15:44	16:38	17:34
60	06:47	07:39	08:28	15:58	16:47	17:39
58	06:42	07:31	08:16	16:09	16:55	17:44
56	06:38	07:24	08:06	16:20	17:02	17:48
54	06:34	07:17	07:57	16:28	17:08	17:52
52	06:30	07:12	07:49	16:36	17:14	17:55
50	06:27	07:06	07:42	16:44	17:19	17:59
45	06:19	06:55	07:27	16:59	17:31	18:06
40	06:12	06:45	07:14	17:11	17:40	18:13
35	06:06	06:36	07:03	17:22	17:49	18:20
30	05:59	06:28	06:54	17:32	17:57	18:26
20	05:47	06:14	06:37	17:48	18:11	18:38
10	05:35	06:00	06:23	18:02	18:25	18:50
0	05:22	05:47	06:09	18:16	18:38	19:03
-10	05:07	05:33	05:55	18:30	18:52	19:18
-20	04:49	05:17	05:40	18:45	19:08	19:36
-30	04:25	04:57	05:23	19:02	19:28	19:59
-35	04:11	04:45	05:13	19:12	19:40	20:14
-40	03:53	04:31	05:01	19:23	19:54	20:31
-45	03:30	04:13	04:48	19:37	20:11	20:54
-50	02:59	03:51	04:31	19:53	20:32	21:24
-52	02:43	03:41	04:23	20:01	20:43	21:40
-54	02:23	03:28	04:14	20:10	20:55	21:60
-56	01:57	03:14	04:04	20:20	21:09	22:25
-58	01:17	02:57	03:52	20:31	21:26	23:02
-60	–:–	02:36	03:39	20:44	21:47	–:–

Lat.	**Moonrise**			**Moonset**		
	Fri	Sat	Sun	Fri	Sat	Sun
72	22:26	–:–	00:26	10:38	10:24	10:08
70	22:26	–:–	00:18	10:35	10:27	10:18
68	22:27	–:–	00:12	10:32	10:29	10:26
66	22:27	–:–	00:06	10:29	10:31	10:33
64	22:27	–:–	00:02	10:27	10:33	10:39
62	22:27	23:58	–:–	10:25	10:35	10:45
60	22:27	23:55	–:–	10:23	10:36	10:49
58	22:27	23:52	–:–	10:22	10:37	10:53
56	22:27	23:50	–:–	10:20	10:39	10:57
54	22:28	23:47	–:–	10:19	10:40	10:60
52	22:28	23:45	–:–	10:18	10:41	11:03
50	22:28	23:43	–:–	10:17	10:41	11:05
45	22:28	23:39	–:–	10:15	10:43	11:11
40	22:28	23:36	–:–	10:13	10:45	11:16
35	22:28	23:33	–:–	10:11	10:46	11:20
30	22:28	23:30	–:–	10:10	10:47	11:24
20	22:29	23:26	–:–	10:07	10:49	11:30
10	22:29	23:22	–:–	10:05	10:51	11:36
0	22:29	23:18	–:–	10:03	10:53	11:42
-10	22:29	23:15	23:60	10:00	10:54	11:47
-20	22:30	23:11	23:52	09:58	10:56	11:53
-30	22:30	23:07	23:44	09:55	10:58	11:59
-35	22:30	23:05	23:39	09:54	10:59	12:03
-40	22:31	23:02	23:33	09:52	11:01	12:07
-45	22:31	22:59	23:27	09:50	11:02	12:12
-50	22:31	22:55	23:19	09:47	11:04	12:18
-52	22:31	22:53	23:16	09:46	11:05	12:21
-54	22:32	22:52	23:12	09:44	11:06	12:24
-56	22:32	22:49	23:08	09:43	11:07	12:28
-58	22:32	22:47	23:03	09:41	11:08	12:31
-60	22:32	22:45	22:58	09:40	11:09	12:36

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	12:08	12:15	12:12	03:50	16:16	19(75%)
26	12:22	12:28	12:12	04:41	17:05	20(65%)
27	12:35	12:41	12:12	05:30	17:54	21(54%)

January 28, 29 ,30 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	126°58.2	225°20.1	-20°25.5	110°17.1	7°20.4	230°57.5	-22°11.4	201°15.9	-22°11.6
1	142°00.6	240°19.6	-20°25.8	125°18.0	7°21.1	245°59.5	-22°11.4	216°18.1	-22°11.5
2	157°03.1	255°19.1	-20°26.0	140°18.9	7°21.8	261°01.4	-22°11.4	231°20.3	-22°11.5
3	172°05.6	270°18.6	-20°26.3	155°19.8	7°22.5	276°03.4	-22°11.5	246°22.4	-22°11.5
4	187°08.0	285°18.0	-20°26.6	170°20.7	7°23.2	291°05.4	-22°11.5	261°24.6	-22°11.5
5	202°10.5	300°17.5	-20°26.9	185°21.6	7°23.8	306°07.4	-22°11.6	276°26.8	-22°11.4
6	217°12.9	315°17.0	-20°27.2	200°22.5	7°24.5	321°09.4	-22°11.6	291°28.9	-22°11.4
7	232°15.4	330°16.5	-20°27.4	215°23.4	7°25.2	336°11.4	-22°11.7	306°31.1	-22°11.4
8	247°17.9	345°16.0	-20°27.7	230°24.3	7°25.9	351°13.3	-22°11.7	321°33.3	-22°11.3
9	262°20.3	0°15.5	-20°28.0	245°25.2	7°26.6	6°15.3	-22°11.7	336°35.4	-22°11.3
10	277°22.8	15°15.0	-20°28.3	260°26.1	7°27.3	21°17.3	-22°11.8	351°37.6	-22°11.3
11	292°25.3	30°14.4	-20°28.5	275°27.0	7°27.9	36°19.3	-22°11.8	6°39.7	-22°11.3
12	307°27.7	45°13.9	-20°28.8	290°27.9	7°28.6	51°21.3	-22°11.9	21°41.9	-22°11.2
13	322°30.2	60°13.4	-20°29.1	305°28.8	7°29.3	66°23.3	-22°11.9	36°44.1	-22°11.2
14	337°32.7	75°12.9	-20°29.4	320°29.7	7°30.0	81°25.3	-22°12.0	51°46.2	-22°11.2
15	352°35.1	90°12.4	-20°29.6	335°30.6	7°30.7	96°27.2	-22°12.0	66°48.4	-22°11.2
16	7°37.6	105°11.9	-20°29.9	350°31.5	7°31.3	111°29.2	-22°12.0	81°50.6	-22°11.1
17	22°40.1	120°11.3	-20°30.2	5°32.4	7°32.0	126°31.2	-22°12.1	96°52.7	-22°11.1
18	37°42.5	135°10.8	-20°30.5	20°33.3	7°32.7	141°33.2	-22°12.1	111°54.9	-22°11.1
19	52°45.0	150°10.3	-20°30.7	35°34.2	7°33.4	156°35.2	-22°12.2	126°57.1	-22°11.0
20	67°47.4	165°09.8	-20°31.0	50°35.1	7°34.1	171°37.2	-22°12.2	141°59.2	-22°11.0
21	82°49.9	180°09.3	-20°31.3	65°36.0	7°34.7	186°39.2	-22°12.2	157°01.4	-22°11.0
22	97°52.4	195°08.7	-20°31.5	80°36.9	7°35.4	201°41.1	-22°12.3	172°03.6	-22°11.0
23	112°54.8	210°08.2	-20°31.8	95°37.8	7°36.1	216°43.1	-22°12.3	187°05.7	-22°10.9
Mer.pass.:15:29		v-0.5 d-0.3 m-4.1		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	127°57.3	225°07.7	-20°32.1	110°38.7	7°36.8	231°45.1	-22°12.4	202°07.9	-22°10.9
1	142°59.8	240°07.2	-20°32.3	125°39.6	7°37.5	246°47.1	-22°12.4	217°10.1	-22°10.9
2	158°02.2	255°06.7	-20°32.6	140°40.5	7°38.1	261°49.1	-22°12.5	232°12.2	-22°10.8
3	173°04.7	270°06.1	-20°32.8	155°41.4	7°38.8	276°51.1	-22°12.5	247°14.4	-22°10.8
4	188°07.2	285°05.6	-20°33.1	170°42.3	7°39.5	291°53.1	-22°12.5	262°16.5	-22°10.8
5	203°09.6	300°05.1	-20°33.4	185°43.2	7°40.2	306°55.1	-22°12.6	277°18.7	-22°10.8
6	218°12.1	315°04.6	-20°33.6	200°44.1	7°40.9	321°57.0	-22°12.6	292°20.9	-22°10.7
7	233°14.5	330°04.0	-20°33.9	215°45.0	7°41.5	336°59.0	-22°12.7	307°23.0	-22°10.7
8	248°17.0	345°03.5	-20°34.1	230°45.9	7°42.2	352°01.0	-22°12.7	322°25.2	-22°10.7
9	263°19.5	0°03.0	-20°34.4	245°46.8	7°42.9	7°03.0	-22°12.8	337°27.4	-22°10.6
10	278°21.9	15°02.4	-20°34.7	260°47.7	7°43.6	22°05.0	-22°12.8	352°29.5	-22°10.6
11	293°24.4	30°01.9	-20°34.9	275°48.6	7°44.3	37°07.0	-22°12.8	7°31.7	-22°10.6
12	308°26.9	45°01.4	-20°35.2	290°49.5	7°44.9	52°09.0	-22°12.9	22°33.9	-22°10.6
13	323°29.3	60°00.9	-20°35.4	305°50.4	7°45.6	67°11.0	-22°12.9	37°36.0	-22°10.5
14	338°31.8	75°00.3	-20°35.7	320°51.2	7°46.3	82°12.9	-22°13.0	52°38.2	-22°10.5
15	353°34.3	89°59.8	-20°35.9	335°52.1	7°47.0	97°14.9	-22°13.0	67°40.4	-22°10.5
16	8°36.7	104°59.3	-20°36.2	350°53.0	7°47.7	112°16.9	-22°13.0	82°42.5	-22°10.5
17	23°39.2	119°58.7	-20°36.4	5°53.9	7°48.3	127°18.9	-22°13.1	97°44.7	-22°10.4
18	38°41.7	134°58.2	-20°36.7	20°54.8	7°49.0	142°20.9	-22°13.1	112°46.9	-22°10.4
19	53°44.1	149°57.7	-20°36.9	35°55.7	7°49.7	157°22.9	-22°13.2	127°49.0	-22°10.4
20	68°46.6	164°57.1	-20°37.2	50°56.6	7°50.4	172°24.9	-22°13.2	142°51.2	-22°10.3
21	83°49.0	179°56.6	-20°37.4	65°57.5	7°51.1	187°26.9	-22°13.3	157°53.4	-22°10.3
22	98°51.5	194°56.1	-20°37.7	80°58.4	7°51.7	202°28.9	-22°13.3	172°55.5	-22°10.3
23	113°54.0	209°55.5	-20°37.9	95°59.3	7°52.4	217°30.9	-22°13.3	187°57.7	-22°10.3
Mer.pass.:15:25		v-0.5 d-0.3 m-4.1		v0.9 d0.7 m0.8		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	128°56.4	224°55.0	-20°38.2	111°00.2	7°53.1	232°32.8	-22°13.4	202°59.9	-22°10.2
1	143°58.9	239°54.5	-20°38.4	126°01.1	7°53.8	247°34.8	-22°13.4	218°02.0	-22°10.2
2	159°01.4	254°53.9	-20°38.7	141°02.0	7°54.4	262°36.8	-22°13.5	233°04.2	-22°10.2
3	174°03.8	269°53.4	-20°38.9	156°02.9	7°55.1	277°38.8	-22°13.5	248°06.4	-22°10.1
4	189°06.3	284°52.9	-20°39.1	171°03.8	7°55.8	292°40.8	-22°13.5	263°08.5	-22°10.1
5	204°08.8	299°52.3	-20°39.4	186°04.7	7°56.5	307°42.8	-22°13.6	278°10.7	-22°10.1
6	219°11.2	314°51.8	-20°39.6	201°05.6	7°57.1	322°44.8	-22°13.6	293°12.9	-22°10.1
7	234°13.7	329°51.2	-20°39.9	216°06.5	7°57.8	337°46.8	-22°13.7	308°15.0	-22°10.0
8	249°16.2	344°50.7	-20°40.1	231°07.4	7°58.5	352°48.8	-22°13.7	323°17.2	-22°10.0
9	264°18.6	359°50.2	-20°40.3	246°08.3	7°59.2	7°50.8	-22°13.7	338°19.4	-22°10.0
10	279°21.1	14°49.6	-20°40.6	261°09.2	7°59.9	22°52.8	-22°13.8	353°21.5	-22°09.9
11	294°23.5	29°49.1	-20°40.8	276°10.1	8°00.5	37°54.8	-22°13.8	8°23.7	-22°09.9
12	309°26.0	44°48.6	-20°41.0	291°11.0	8°01.2	52°56.7	-22°13.9	23°25.9	-22°09.9
13	324°28.5	59°48.0	-20°41.3	306°11.9	8°01.9	67°58.7	-22°13.9	38°28.0	-22°09.9
14	339°30.9	74°47.5	-20°41.5	321°12.8	8°02.6	83°00.7	-22°14.0	53°30.2	-22°09.8
15	354°33.4	89°46.9	-20°41.7	336°13.7	8°03.2	98°02.7	-22°14.0	68°32.4	-22°09.8
16	9°35.9	104°46.4	-20°42.0	351°14.6	8°03.9	113°04.7	-22°14.0	83°34.5	-22°09.8
17	24°38.3	119°45.8	-20°42.2	6°15.5	8°04.6	128°06.7	-22°14.1	98°36.7	-22°09.7
18	39°40.8	134°45.3	-20°42.4	21°16.4	8°05.3	143°08.7	-22°14.1	113°38.9	-22°09.7
19	54°43.3	149°44.8	-20°42.7	36°17.2	8°05.9	158°10.7	-22°14.2	128°41.0	-22°09.7
20	69°45.7	164°44.2	-20°42.9	51°18.1	8°06.6	173°12.7	-22°14.2	143°43.2	-22°09.7
21	84°48.2	179°43.7	-20°43.1	66°19.0	8°07.3	188°14.7	-22°14.2	158°45.4	-22°09.6
22	99°50.7	194°43.1	-20°43.3	81°19.9	8°08.0	203°16.7	-22°14.3	173°47.5	-22°09.6
23	114°53.1	209°42.6	-20°43.6	96°20.8	8°08.6	218°18.7	-22°14.3	188°49.7	-22°09.6
Mer.pass.:15:21		v-0.5 d-0.2 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°39.7	29°11.7
Ankaa	353°12.1	-42°12.5
Schedar	349°36.4	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.1	-57°08.8
Hamal	327°56.5	23°33.1
Polaris	316°00.8	89°20.9
Akamar	315°15.4	-40°14.1
Menkar	314°11.0	4°09.7
Mirfak	308°34.7	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.1
Capella	280°28.5	46°01.0
Bellatrix	278°27.6	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.0	-52°42.7
Sirius	258°29.9	-16°44.6
Adara	255°09.2	-29°00.1
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.3
Suhail	222°49.2	-43°30.6
Miaplacidus	221°38.0	-69°47.7
Alphard	217°52.0	-8°44.6
Regulus	207°39.1	11°52.3
Dubhe	193°46.5	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°04.7	-63°11.9
Gacrux	171°56.3	-57°12.9
Alioth	166°17.2	55°51.2
Spica	158°27.1	-11°15.5
Alcaid	152°55.8	49°12.9
Hadar	148°42.4	-60°27.5
Menkent	148°03.0	-36°27.5
Arcturus	145°52.1	19°05.2
Rigil Kent.	139°46.5	-60°54.4
Zubenelg.	137°01.2	-16°07.1
Kochab	137°20.3	74°04.4
Alphecca	126°07.9	26°39.0
Antares	112°21.7	-26°28.2
Atria	107°20.4	-69°03.3
Sabik	102°08.4	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.2	12°32.8
Etamin	90°44.8	51°29.1
Kaus Aust.	83°39.1	-34°22.3
Vega	80°36.8	38°48.0
Nunki	75°53.9	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.8	-56°40.4
Deneb	49°29.3	45°20.9
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/1/2	**SHA**	**Mer.pass**
Venus	98°21.9	08:59
Mars	343°18.9	16:38
Jupiter	103°59.3	08:35
Saturn	74°17.8	10:33

2019/1/2	**SHA**	**Mer.pass**
Venus	97°10.4	08:60
Mars	342°41.4	16:36
Jupiter	103°47.8	08:32
Saturn	74°10.6	10:30

2019/1/3	**SHA**	**Mer.pass**
Venus	95°58.6	09:01
Mars	342°03.8	16:35
Jupiter	103°36.4	08:29
Saturn	74°03.4	10:27

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	176°48.3	-18°19.7	268°29.8	11.9	-9°39.1	-10.9	57.3
1	191°48.1	-18°19.0	283°00.6	11.9	-9°50.0	-10.9	57.2
2	206°48.0	-18°18.4	297°31.5	11.9	-10°00.9	-10.8	57.2
3	221°47.9	-18°17.7	312°02.4	11.9	-10°11.7	-10.8	57.2
4	236°47.8	-18°17.0	326°33.3	11.9	-10°22.4	-10.7	57.1
5	251°47.7	-18°16.4	341°04.2	11.9	-10°33.0	-10.6	57.1
6	266°47.5	-18°15.7	355°35.1	11.9	-10°43.6	-10.6	57.1
7	281°47.4	-18°15.1	10°06.0	11.9	-10°54.2	-10.5	57.0
8	296°47.3	-18°14.4	24°36.9	11.9	-11°04.6	-10.4	57.0
9	311°47.2	-18°13.8	39°07.8	11.9	-11°15.0	-10.4	57.0
10	326°47.1	-18°13.1	53°38.7	11.9	-11°25.3	-10.3	56.9
11	341°46.9	-18°12.5	68°09.6	11.9	-11°35.6	-10.2	56.9
12	356°46.8	-18°11.8	82°40.5	11.9	-11°45.8	-10.2	56.9
13	11°46.7	-18°11.1	97°11.4	11.9	-11°55.9	-10.1	56.8
14	26°46.6	-18°10.5	111°42.3	11.9	-12°06.0	-10.0	56.8
15	41°46.5	-18°09.8	126°13.2	11.9	-12°15.9	-9.9	56.8
16	56°46.3	-18°09.2	140°44.1	11.9	-12°25.8	-9.9	56.7
17	71°46.2	-18°08.5	155°15.0	11.9	-12°35.7	-9.8	56.7
18	86°46.1	-18°07.8	169°45.8	11.9	-12°45.4	-9.7	56.7
19	101°46.0	-18°07.2	184°16.7	11.9	-12°55.1	-9.7	56.6
20	116°45.9	-18°06.5	198°47.6	11.9	-13°04.7	-9.6	56.6
21	131°45.8	-18°05.8	213°18.4	11.8	-13°14.3	-9.5	56.6
22	146°45.6	-18°05.2	227°49.3	11.8	-13°23.7	-9.4	56.5
23	161°45.5	-18°04.5	242°20.1	11.8	-13°33.1	-9.4	56.5
	SD.=16.2	d=0.7			S.D.=15.6		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	176°45.4	-18°03.9	256°50.9	11.8	-13°42.4	-9.3	56.5
1	191°45.3	-18°03.2	271°21.7	11.8	-13°51.7	-9.2	56.5
2	206°45.2	-18°02.5	285°52.6	11.8	-14°00.8	-9.1	56.4
3	221°45.1	-18°01.9	300°23.4	11.8	-14°09.9	-9.0	56.4
4	236°45.0	-18°01.2	314°54.2	11.8	-14°18.9	-9.0	56.4
5	251°44.8	-18°00.5	329°24.9	11.8	-14°27.9	-8.9	56.3
6	266°44.7	-17°59.8	343°55.7	11.8	-14°36.7	-8.8	56.3
7	281°44.6	-17°59.2	358°26.5	11.8	-14°45.5	-8.7	56.3
8	296°44.5	-17°58.5	12°57.2	11.7	-14°54.1	-8.6	56.2
9	311°44.4	-17°57.8	27°28.0	11.7	-15°02.7	-8.6	56.2
10	326°44.3	-17°57.2	41°58.7	11.7	-15°11.3	-8.5	56.2
11	341°44.2	-17°56.5	56°29.4	11.7	-15°19.7	-8.4	56.2
12	356°44.1	-17°55.8	71°00.1	11.7	-15°28.1	-8.3	56.1
13	11°44.0	-17°55.2	85°30.8	11.7	-15°36.3	-8.2	56.1
14	26°43.8	-17°54.5	100°01.5	11.7	-15°44.5	-8.1	56.1
15	41°43.7	-17°53.8	114°32.2	11.7	-15°52.6	-8.1	56.0
16	56°43.6	-17°53.1	129°02.8	11.7	-16°00.6	-8.0	56.0
17	71°43.5	-17°52.5	143°33.5	11.6	-16°08.6	-7.9	56.0
18	86°43.4	-17°51.8	158°04.1	11.6	-16°16.4	-7.8	56.0
19	101°43.3	-17°51.1	172°34.7	11.6	-16°24.2	-7.7	55.9
20	116°43.2	-17°50.4	187°05.3	11.6	-16°31.8	-7.6	55.9
21	131°43.1	-17°49.8	201°35.9	11.6	-16°39.4	-7.5	55.9
22	146°43.0	-17°49.1	216°06.5	11.6	-16°46.9	-7.5	55.9
23	161°42.9	-17°48.4	230°37.1	11.6	-16°54.3	-7.4	55.8
	SD.=16.2	d=0.7			S.D.=15.4		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°42.8	-17°47.7	245°07.6	11.5	-17°01.7	-7.3	55.8
1	191°42.7	-17°47.0	259°38.2	11.5	-17°08.9	-7.2	55.8
2	206°42.6	-17°46.4	274°08.7	11.5	-17°16.0	-7.1	55.7
3	221°42.4	-17°45.7	288°39.2	11.5	-17°23.1	-7.0	55.7
4	236°42.3	-17°45.0	303°09.7	11.5	-17°30.0	-6.9	55.7
5	251°42.2	-17°44.3	317°40.2	11.5	-17°36.9	-6.8	55.7
6	266°42.1	-17°43.6	332°10.7	11.5	-17°43.7	-6.7	55.6
7	281°42.0	-17°43.0	346°41.1	11.5	-17°50.4	-6.6	55.6
8	296°41.9	-17°42.3	1°11.6	11.4	-17°57.0	-6.5	55.6
9	311°41.8	-17°41.6	15°42.0	11.4	-18°03.5	-6.5	55.6
10	326°41.7	-17°40.9	30°12.4	11.4	-18°09.9	-6.4	55.5
11	341°41.6	-17°40.2	44°42.8	11.4	-18°16.2	-6.3	55.5
12	356°41.5	-17°39.5	59°13.2	11.4	-18°22.4	-6.2	55.5
13	11°41.4	-17°38.8	73°43.6	11.4	-18°28.5	-6.1	55.5
14	26°41.3	-17°38.2	88°14.0	11.4	-18°34.5	-6.0	55.5
15	41°41.2	-17°37.5	102°44.3	11.3	-18°40.5	-5.9	55.4
16	56°41.1	-17°36.8	117°14.7	11.3	-18°46.3	-5.8	55.4
17	71°41.0	-17°36.1	131°45.0	11.3	-18°52.1	-5.7	55.4
18	86°40.9	-17°35.4	146°15.3	11.3	-18°57.7	-5.6	55.4
19	101°40.8	-17°34.7	160°45.6	11.3	-19°03.3	-5.5	55.3
20	116°40.7	-17°34.0	175°15.9	11.3	-19°08.7	-5.4	55.3
21	131°40.6	-17°33.3	189°46.2	11.3	-19°14.1	-5.3	55.3
22	146°40.5	-17°32.7	204°16.4	11.3	-19°19.3	-5.2	55.3
23	161°40.4	-17°32.0	218°46.7	11.2	-19°24.5	-5.1	55.3
	SD.=16.2	d=0.7			S.D.=15.2		

	Twilight					Twilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:21	08:53	10:58	13:29	15:34	17:07
70	07:12	08:32	10:04	14:23	15:55	17:16
68	07:04	08:16	09:31	14:56	16:12	17:23
66	06:57	08:02	09:08	15:19	16:25	17:30
64	06:52	07:51	08:49	15:38	16:36	17:36
62	06:46	07:41	08:34	15:53	16:46	17:41
60	06:42	07:33	08:21	16:06	16:54	17:45
58	06:38	07:26	08:10	16:16	17:01	17:49
56	06:34	07:19	08:01	16:26	17:08	17:53
54	06:30	07:13	07:53	16:34	17:14	17:57
52	06:27	07:08	07:45	16:42	17:19	17:60
50	06:24	07:03	07:38	16:49	17:24	18:03
45	06:17	06:52	07:24	17:03	17:35	18:10
40	06:10	06:43	07:12	17:15	17:44	18:16
35	06:04	06:34	07:01	17:25	17:52	18:23
30	05:58	06:27	06:52	17:34	17:60	18:28
20	05:47	06:13	06:36	17:50	18:13	18:40
10	05:35	06:01	06:23	18:04	18:26	18:51
0	05:23	05:48	06:10	18:17	18:38	19:04
-10	05:08	05:34	05:56	18:30	18:52	19:18
-20	04:51	05:19	05:42	18:44	19:07	19:35
-30	04:29	04:60	05:26	19:00	19:26	19:57
-35	04:14	04:48	05:16	19:10	19:37	20:11
-40	03:57	04:35	05:05	19:21	19:51	20:28
-45	03:35	04:18	04:52	19:33	20:07	20:49
-50	03:06	03:57	04:36	19:49	20:28	21:18
-52	02:51	03:47	04:28	19:57	20:38	21:33
-54	02:33	03:35	04:20	20:05	20:49	21:51
-56	02:09	03:22	04:10	20:14	21:02	22:14
-58	01:37	03:06	03:60	20:25	21:18	22:44
-60	–:–	02:47	03:47	20:37	21:37	–:–

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	02:26	04:33	–:–	09:50	09:24	–:–
70	02:08	04:00	05:60	10:09	09:57	09:39
68	01:55	03:37	05:20	10:24	10:22	10:20
66	01:44	03:19	04:52	10:36	10:41	10:48
64	01:35	03:05	04:32	10:47	10:56	11:09
62	01:27	02:53	04:15	10:55	11:09	11:27
60	01:20	02:42	04:01	11:03	11:20	11:41
58	01:14	02:33	03:49	11:10	11:29	11:54
56	01:09	02:26	03:39	11:16	11:38	12:04
54	01:04	02:19	03:30	11:21	11:45	12:14
52	01:00	02:12	03:22	11:26	11:52	12:22
50	00:56	02:07	03:14	11:31	11:58	12:30
45	00:48	01:55	02:59	11:40	12:11	12:46
40	00:41	01:45	02:46	11:48	12:22	12:59
35	00:35	01:36	02:36	11:55	12:32	13:11
30	00:30	01:29	02:26	12:01	12:40	13:21
20	00:22	01:16	02:10	12:12	12:54	13:38
10	00:14	01:05	01:56	12:21	13:06	13:53
0	00:07	00:55	01:43	12:30	13:18	14:07
-10	–:–	00:45	01:30	12:39	13:30	14:21
-20	–:–	00:34	01:17	12:48	13:42	14:36
-30	–:–	00:21	01:01	12:59	13:57	14:53
-35	–:–	00:14	00:52	13:05	14:05	15:03
-40	–:–	00:06	00:42	13:12	14:15	15:15
-45	23:57	–:–	00:30	13:20	14:26	15:29
-50	23:46	–:–	00:15	13:30	14:39	15:45
-52	23:40	–:–	00:08	13:35	14:46	15:53
-54	23:35	–:–	00:01	13:40	14:53	16:02
-56	23:28	23:52	–:–	13:46	15:01	16:12
-58	23:21	23:43	–:–	13:52	15:10	16:23
-60	23:13	23:32	23:57	13:59	15:20	16:36

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	12:47	12:53	12:12	06:18	18:42	22(44%)
29	12:58	13:04	12:13	07:06	19:30	23(34%)
30	13:09	13:14	12:13	07:55	20:19	24(24%)

January 31, 01 ,02 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	129°55.6	224°42.0	-20°43.8	111°21.7	8°09.3	233°20.7	-22°14.4	203°51.9	-22°09.6
1	144°58.0	239°41.5	-20°44.0	126°22.6	8°10.0	248°22.7	-22°14.4	218°54.0	-22°09.5
2	160°00.5	254°40.9	-20°44.2	141°23.5	8°10.7	263°24.7	-22°14.4	233°56.2	-22°09.5
3	175°03.0	269°40.4	-20°44.5	156°24.4	8°11.3	278°26.7	-22°14.5	248°58.4	-22°09.5
4	190°05.4	284°39.8	-20°44.7	171°25.3	8°12.0	293°28.7	-22°14.5	264°00.5	-22°09.4
5	205°07.9	299°39.3	-20°44.9	186°26.2	8°12.7	308°30.6	-22°14.6	279°02.7	-22°09.4
6	220°10.4	314°38.7	-20°45.1	201°27.1	8°13.4	323°32.6	-22°14.6	294°04.9	-22°09.4
7	235°12.8	329°38.2	-20°45.3	216°28.0	8°14.0	338°34.6	-22°14.6	309°07.0	-22°09.4
8	250°15.3	344°37.6	-20°45.6	231°28.9	8°14.7	353°36.6	-22°14.7	324°09.2	-22°09.3
9	265°17.8	359°37.1	-20°45.8	246°29.8	8°15.4	8°38.6	-22°14.7	339°11.4	-22°09.3
10	280°20.2	14°36.5	-20°46.0	261°30.7	8°16.1	23°40.6	-22°14.8	354°13.6	-22°09.3
11	295°22.7	29°36.0	-20°46.2	276°31.6	8°16.7	38°42.6	-22°14.8	9°15.7	-22°09.2
12	310°25.1	44°35.4	-20°46.4	291°32.4	8°17.4	53°44.6	-22°14.8	24°17.9	-22°09.2
13	325°27.6	59°34.9	-20°46.6	306°33.3	8°18.1	68°46.6	-22°14.9	39°20.1	-22°09.2
14	340°30.1	74°34.3	-20°46.9	321°34.2	8°18.8	83°48.6	-22°14.9	54°22.2	-22°09.2
15	355°32.5	89°33.8	-20°47.1	336°35.1	8°19.4	98°50.6	-22°15.0	69°24.4	-22°09.1
16	10°35.0	104°33.2	-20°47.3	351°36.0	8°20.1	113°52.6	-22°15.0	84°26.6	-22°09.1
17	25°37.5	119°32.7	-20°47.5	6°36.9	8°20.8	128°54.6	-22°15.0	99°28.7	-22°09.1
18	40°39.9	134°32.1	-20°47.7	21°37.8	8°21.4	143°56.6	-22°15.1	114°30.9	-22°09.0
19	55°42.4	149°31.6	-20°47.9	36°38.7	8°22.1	158°58.6	-22°15.1	129°33.1	-22°09.0
20	70°44.9	164°31.0	-20°48.1	51°39.6	8°22.8	174°00.6	-22°15.2	144°35.2	-22°09.0
21	85°47.3	179°30.4	-20°48.3	66°40.5	8°23.5	189°02.6	-22°15.2	159°37.4	-22°09.0
22	100°49.8	194°29.9	-20°48.5	81°41.4	8°24.1	204°04.6	-22°15.2	174°39.6	-22°08.9
23	115°52.3	209°29.3	-20°48.7	96°42.3	8°24.8	219°06.6	-22°15.3	189°41.7	-22°08.9
Mer.pass.:15:17		v-0.5 d-0.2 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	130°54.7	224°28.8	-20°48.9	111°43.2	8°25.5	234°08.6	-22°15.3	204°43.9	-22°08.9
1	145°57.2	239°28.2	-20°49.1	126°44.1	8°26.2	249°10.6	-22°15.4	219°46.1	-22°08.8
2	160°59.6	254°27.7	-20°49.3	141°44.9	8°26.8	264°12.6	-22°15.4	234°48.3	-22°08.8
3	176°02.1	269°27.1	-20°49.5	156°45.8	8°27.5	279°14.6	-22°15.4	249°50.4	-22°08.8
4	191°04.6	284°26.5	-20°49.7	171°46.7	8°28.2	294°16.6	-22°15.5	264°52.6	-22°08.8
5	206°07.0	299°26.0	-20°49.9	186°47.6	8°28.8	309°18.6	-22°15.5	279°54.8	-22°08.7
6	221°09.5	314°25.4	-20°50.1	201°48.5	8°29.5	324°20.6	-22°15.6	294°56.9	-22°08.7
7	236°12.0	329°24.9	-20°50.3	216°49.4	8°30.2	339°22.6	-22°15.6	309°59.1	-22°08.7
8	251°14.4	344°24.3	-20°50.5	231°50.3	8°30.9	354°24.6	-22°15.6	325°01.3	-22°08.6
9	266°16.9	359°23.7	-20°50.7	246°51.2	8°31.5	9°26.6	-22°15.7	340°03.4	-22°08.6
10	281°19.4	14°23.2	-20°50.9	261°52.1	8°32.2	24°28.6	-22°15.7	355°05.6	-22°08.6
11	296°21.8	29°22.6	-20°51.1	276°53.0	8°32.9	39°30.6	-22°15.7	10°07.8	-22°08.6
12	311°24.3	44°22.1	-20°51.3	291°53.9	8°33.5	54°32.6	-22°15.8	25°10.0	-22°08.5
13	326°26.8	59°21.5	-20°51.5	306°54.8	8°34.2	69°34.6	-22°15.8	40°12.1	-22°08.5
14	341°29.2	74°20.9	-20°51.7	321°55.6	8°34.9	84°36.6	-22°15.9	55°14.3	-22°08.5
15	356°31.7	89°20.4	-20°51.9	336°56.5	8°35.5	99°38.6	-22°15.9	70°16.5	-22°08.4
16	11°34.1	104°19.8	-20°52.1	351°57.4	8°36.2	114°40.6	-22°15.9	85°18.6	-22°08.4
17	26°36.6	119°19.2	-20°52.3	6°58.3	8°36.9	129°42.6	-22°16.0	100°20.8	-22°08.4
18	41°39.1	134°18.7	-20°52.5	21°59.2	8°37.6	144°44.6	-22°16.0	115°23.0	-22°08.4
19	56°41.5	149°18.1	-20°52.7	37°00.1	8°38.2	159°46.6	-22°16.1	130°25.1	-22°08.3
20	71°44.0	164°17.5	-20°52.8	52°01.0	8°38.9	174°48.6	-22°16.1	145°27.3	-22°08.3
21	86°46.5	179°17.0	-20°53.0	67°01.9	8°39.6	189°50.6	-22°16.1	160°29.5	-22°08.3
22	101°48.9	194°16.4	-20°53.2	82°02.8	8°40.2	204°52.6	-22°16.2	175°31.7	-22°08.3
23	116°51.4	209°15.8	-20°53.4	97°03.7	8°40.9	219°54.6	-22°16.2	190°33.8	-22°08.2
Mer.pass.:15:13		v-0.6 d-0.2 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	131°53.9	224°15.3	-20°53.6	112°04.5	8°41.6	234°56.6	-22°16.3	205°36.0	-22°08.2
1	146°56.3	239°14.7	-20°53.8	127°05.4	8°42.2	249°58.6	-22°16.3	220°38.2	-22°08.2
2	161°58.8	254°14.1	-20°53.9	142°06.3	8°42.9	265°00.6	-22°16.3	235°40.3	-22°08.1
3	177°01.3	269°13.6	-20°54.1	157°07.2	8°43.6	280°02.6	-22°16.4	250°42.5	-22°08.1
4	192°03.7	284°13.0	-20°54.3	172°08.1	8°44.3	295°04.6	-22°16.4	265°44.7	-22°08.1
5	207°06.2	299°12.4	-20°54.5	187°09.0	8°44.9	310°06.6	-22°16.4	280°46.9	-22°08.1
6	222°08.6	314°11.8	-20°54.7	202°09.9	8°45.6	325°08.6	-22°16.5	295°49.0	-22°08.0
7	237°11.1	329°11.3	-20°54.8	217°10.8	8°46.3	340°10.7	-22°16.5	310°51.2	-22°08.0
8	252°13.6	344°10.7	-20°55.0	232°11.7	8°46.9	355°12.7	-22°16.6	325°53.4	-22°08.0
9	267°16.0	359°10.1	-20°55.2	247°12.6	8°47.6	10°14.7	-22°16.6	340°55.5	-22°07.9
10	282°18.5	14°09.6	-20°55.4	262°13.4	8°48.3	25°16.7	-22°16.6	355°57.7	-22°07.9
11	297°21.0	29°09.0	-20°55.5	277°14.3	8°48.9	40°18.7	-22°16.7	10°59.9	-22°07.9
12	312°23.4	44°08.4	-20°55.7	292°15.2	8°49.6	55°20.7	-22°16.7	26°02.1	-22°07.9
13	327°25.9	59°07.8	-20°55.9	307°16.1	8°50.3	70°22.7	-22°16.8	41°04.2	-22°07.8
14	342°28.4	74°07.3	-20°56.1	322°17.0	8°50.9	85°24.7	-22°16.8	56°06.4	-22°07.8
15	357°30.8	89°06.7	-20°56.2	337°17.9	8°51.6	100°26.7	-22°16.8	71°08.6	-22°07.8
16	12°33.3	104°06.1	-20°56.4	352°18.8	8°52.3	115°28.7	-22°16.9	86°10.7	-22°07.7
17	27°35.7	119°05.5	-20°56.6	7°19.7	8°52.9	130°30.7	-22°16.9	101°12.9	-22°07.7
18	42°38.2	134°05.0	-20°56.7	22°20.6	8°53.6	145°32.7	-22°16.9	116°15.1	-22°07.7
19	57°40.7	149°04.4	-20°56.9	37°21.4	8°54.3	160°34.7	-22°17.0	131°17.3	-22°07.7
20	72°43.1	164°03.8	-20°57.1	52°22.3	8°54.9	175°36.7	-22°17.0	146°19.4	-22°07.6
21	87°45.6	179°03.2	-20°57.2	67°23.2	8°55.6	190°38.7	-22°17.1	161°21.6	-22°07.6
22	102°48.1	194°02.7	-20°57.4	82°24.1	8°56.3	205°40.7	-22°17.1	176°23.8	-22°07.6
23	117°50.5	209°02.1	-20°57.6	97°25.0	8°56.9	220°42.8	-22°17.1	191°26.0	-22°07.5
Mer.pass.:15:09		v-0.6 d-0.2 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.7
Ankaa	353°12.1	-42°12.5
Schedar	349°36.4	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.1	-57°08.8
Hamal	327°56.5	23°33.1
Polaris	316°02.1	89°20.9
Akamar	315°15.4	-40°14.1
Menkar	314°11.0	4°09.6
Mirfak	308°34.7	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.1
Capella	280°28.5	46°01.0
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.0	-52°42.7
Sirius	258°29.9	-16°44.6
Adara	255°09.2	-29°00.1
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.3
Suhail	222°49.2	-43°30.6
Miaplacidus	221°38.0	-69°47.7
Alphard	217°52.0	-8°44.6
Regulus	207°39.1	11°52.3
Dubhe	193°46.5	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°04.6	-63°12.0
Gacrux	171°56.3	-57°12.9
Alioth	166°17.1	55°51.2
Spica	158°27.1	-11°15.5
Alcaid	152°55.8	49°12.9
Hadar	148°42.3	-60°27.5
Menkent	148°03.0	-36°27.5
Arcturus	145°52.1	19°05.2
Rigil Kent.	139°46.5	-60°54.4
Zubenelg.	137°01.2	-16°07.1
Kochab	137°20.2	74°04.4
Alphecca	126°07.9	26°39.0
Antares	112°21.7	-26°28.2
Atria	107°20.4	-69°03.3
Sabik	102°08.3	-15°44.7
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.1	12°32.8
Etamin	90°44.8	51°29.1
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.8	38°48.0
Nunki	75°53.9	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.8	-56°40.4
Deneb	49°29.3	45°20.9
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.3
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/1/3	**SHA**	**Mer.pass**
Venus	94°46.4	09:02
Mars	341°26.1	16:34
Jupiter	103°25.1	08:26
Saturn	73°56.3	10:23

2019/2/1	**SHA**	**Mer.pass**
Venus	93°34.1	09:02
Mars	340°48.4	16:32
Jupiter	103°13.9	08:22
Saturn	73°49.2	10:20

2019/2/2	**SHA**	**Mer.pass**
Venus	92°21.4	09:03
Mars	340°10.7	16:31
Jupiter	103°02.8	08:19
Saturn	73°42.1	10:16

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°40.3	-17°31.3	233°16.9	11.2	-19°29.6	-5.0	55.2
1	191°40.2	-17°30.6	247°47.2	11.2	-19°34.5	-4.9	55.2
2	206°40.1	-17°29.9	262°17.4	11.2	-19°39.4	-4.8	55.2
3	221°40.0	-17°29.2	276°47.6	11.2	-19°44.1	-4.7	55.2
4	236°39.9	-17°28.5	291°17.8	11.2	-19°48.8	-4.6	55.1
5	251°39.8	-17°27.8	305°48.0	11.2	-19°53.4	-4.5	55.1
6	266°39.7	-17°27.1	320°18.2	11.2	-19°57.8	-4.4	55.1
7	281°39.6	-17°26.4	334°48.3	11.2	-20°02.2	-4.3	55.1
8	296°39.5	-17°25.7	349°18.5	11.2	-20°06.5	-4.2	55.1
9	311°39.4	-17°25.0	3°48.6	11.1	-20°10.6	-4.1	55.0
10	326°39.3	-17°24.3	18°18.8	11.1	-20°14.7	-4.0	55.0
11	341°39.3	-17°23.6	32°48.9	11.1	-20°18.7	-3.9	55.0
12	356°39.2	-17°22.9	47°19.0	11.1	-20°22.5	-3.8	55.0
13	11°39.1	-17°22.2	61°49.2	11.1	-20°26.3	-3.7	55.0
14	26°39.0	-17°21.5	76°19.3	11.1	-20°29.9	-3.6	55.0
15	41°38.9	-17°20.8	90°49.4	11.1	-20°33.5	-3.5	54.9
16	56°38.8	-17°20.1	105°19.5	11.1	-20°37.0	-3.4	54.9
17	71°38.7	-17°19.4	119°49.6	11.1	-20°40.3	-3.3	54.9
18	86°38.6	-17°18.7	134°19.7	11.1	-20°43.6	-3.2	54.9
19	101°38.5	-17°18.0	148°49.8	11.1	-20°46.7	-3.1	54.9
20	116°38.4	-17°17.3	163°19.8	11.1	-20°49.7	-3.0	54.8
21	131°38.3	-17°16.6	177°49.9	11.1	-20°52.7	-2.9	54.8
22	146°38.2	-17°15.9	192°20.0	11.1	-20°55.5	-2.8	54.8
23	161°38.1	-17°15.2	206°50.1	11.1	-20°58.2	-2.7	54.8
	SD.=16.2	d=0.7			S.D.=15.1		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°38.1	-17°14.5	221°20.1	11.1	-21°00.9	-2.6	54.8
1	191°38.0	-17°13.8	235°50.2	11.1	-21°03.4	-2.5	54.8
2	206°37.9	-17°13.1	250°20.3	11.1	-21°05.8	-2.4	54.7
3	221°37.8	-17°12.4	264°50.3	11.1	-21°08.1	-2.3	54.7
4	236°37.7	-17°11.7	279°20.4	11.1	-21°10.4	-2.2	54.7
5	251°37.6	-17°11.0	293°50.5	11.1	-21°12.5	-2.1	54.7
6	266°37.5	-17°10.3	308°20.5	11.1	-21°14.5	-2.0	54.7
7	281°37.4	-17°09.6	322°50.6	11.1	-21°16.4	-1.8	54.7
8	296°37.4	-17°08.9	337°20.7	11.1	-21°18.2	-1.7	54.6
9	311°37.3	-17°08.1	351°50.7	11.1	-21°19.9	-1.6	54.6
10	326°37.2	-17°07.4	6°20.8	11.1	-21°21.5	-1.5	54.6
11	341°37.1	-17°06.7	20°50.9	11.1	-21°22.9	-1.4	54.6
12	356°37.0	-17°06.0	35°21.0	11.1	-21°24.3	-1.3	54.6
13	11°36.9	-17°05.3	49°51.1	11.1	-21°25.6	-1.2	54.6
14	26°36.8	-17°04.6	64°21.2	11.1	-21°26.8	-1.1	54.6
15	41°36.8	-17°03.9	78°51.3	11.1	-21°27.8	-1.0	54.5
16	56°36.7	-17°03.2	93°21.4	11.1	-21°28.8	-0.9	54.5
17	71°36.6	-17°02.4	107°51.5	11.1	-21°29.7	-0.8	54.5
18	86°36.5	-17°01.7	122°21.6	11.1	-21°30.4	-0.7	54.5
19	101°36.4	-17°01.0	136°51.7	11.1	-21°31.1	-0.6	54.5
20	116°36.3	-17°00.3	151°21.9	11.1	-21°31.6	-0.5	54.5
21	131°36.3	-16°59.6	165°52.0	11.1	-21°32.0	-0.4	54.5
22	146°36.2	-16°58.9	180°22.1	11.2	-21°32.4	-0.3	54.5
23	161°36.1	-16°58.2	194°52.3	11.2	-21°32.6	-0.2	54.4
	SD.=16.2	d=0.7			S.D.=14.9		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°36.0	-16°57.4	209°22.5	11.2	-21°32.8	-0.1	54.4
1	191°35.9	-16°56.7	223°52.7	11.2	-21°32.8	0.0	54.4
2	206°35.8	-16°56.0	238°22.9	11.2	-21°32.7	0.1	54.4
3	221°35.8	-16°55.3	252°53.1	11.2	-21°32.5	0.2	54.4
4	236°35.7	-16°54.6	267°23.3	11.2	-21°32.2	0.3	54.4
5	251°35.6	-16°53.8	281°53.5	11.2	-21°31.9	0.4	54.4
6	266°35.5	-16°53.1	296°23.8	11.3	-21°31.4	0.5	54.4
7	281°35.5	-16°52.4	310°54.1	11.3	-21°30.8	0.6	54.3
8	296°35.4	-16°51.7	325°24.3	11.3	-21°30.1	0.7	54.3
9	311°35.3	-16°51.0	339°54.6	11.3	-21°29.3	0.8	54.3
10	326°35.2	-16°50.2	354°25.0	11.3	-21°28.4	1.0	54.3
11	341°35.1	-16°49.5	8°55.3	11.3	-21°27.4	1.1	54.3
12	356°35.1	-16°48.8	23°25.6	11.4	-21°26.3	1.2	54.3
13	11°35.0	-16°48.1	37°56.0	11.4	-21°25.1	1.3	54.3
14	26°34.9	-16°47.3	52°26.4	11.4	-21°23.8	1.4	54.3
15	41°34.8	-16°46.6	66°56.8	11.4	-21°22.3	1.5	54.3
16	56°34.8	-16°45.9	81°27.2	11.4	-21°20.8	1.6	54.2
17	71°34.7	-16°45.2	95°57.7	11.5	-21°19.2	1.7	54.2
18	86°34.6	-16°44.4	110°28.2	11.5	-21°17.5	1.8	54.2
19	101°34.5	-16°43.7	124°58.7	11.5	-21°15.7	1.9	54.2
20	116°34.5	-16°43.0	139°29.2	11.5	-21°13.8	2.0	54.2
21	131°34.4	-16°42.3	153°59.7	11.5	-21°11.8	2.1	54.2
22	146°34.3	-16°41.5	168°30.3	11.6	-21°09.7	2.2	54.2
23	161°34.2	-16°40.8	183°00.9	11.6	-21°07.5	2.3	54.2
	SD.=16.2	d=0.7			S.D.=14.8		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:11	08:40	10:29	13:59	15:49	17:18
70	07:03	08:21	09:47	14:41	16:07	17:26
68	06:56	08:06	09:18	15:10	16:22	17:33
66	06:50	07:54	08:57	15:31	16:34	17:38
64	06:45	07:44	08:40	15:48	16:44	17:43
62	06:40	07:35	08:26	16:02	16:53	17:48
60	06:36	07:27	08:15	16:13	17:01	17:52
58	06:33	07:20	08:04	16:23	17:08	17:55
56	06:29	07:14	07:55	16:32	17:14	17:59
54	06:26	07:09	07:48	16:40	17:19	18:02
52	06:23	07:04	07:40	16:47	17:24	18:05
50	06:20	06:59	07:34	16:54	17:29	18:07
45	06:14	06:49	07:20	17:07	17:39	18:14
40	06:08	06:40	07:09	17:19	17:47	18:20
35	06:02	06:32	06:59	17:28	17:55	18:25
30	05:57	06:25	06:50	17:37	18:02	18:31
20	05:46	06:13	06:36	17:52	18:15	18:41
10	05:35	06:01	06:22	18:05	18:27	18:52
0	05:23	05:48	06:10	18:17	18:39	19:04
-10	05:10	05:35	05:57	18:30	18:52	19:17
-20	04:53	05:21	05:44	18:43	19:06	19:34
-30	04:32	05:03	05:28	18:58	19:24	19:55
-35	04:18	04:52	05:19	19:07	19:35	20:08
-40	04:02	04:39	05:09	19:18	19:48	20:24
-45	03:41	04:23	04:56	19:30	20:03	20:45
-50	03:13	04:03	04:41	19:45	20:23	21:12
-52	02:59	03:53	04:34	19:52	20:32	21:26
-54	02:42	03:43	04:26	19:60	20:43	21:42
-56	02:21	03:30	04:17	20:08	20:55	22:03
-58	01:53	03:15	04:07	20:18	21:10	22:30
-60	01:07	02:57	03:55	20:30	21:27	23:11

	Moonrise			Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	07:02	08:36	09:34	10:20	10:29	11:14
66	06:20	07:36	08:30	11:02	11:29	12:17
64	05:52	07:02	07:55	11:30	12:03	12:52
62	05:31	06:37	07:30	11:52	12:28	13:18
60	05:14	06:18	07:10	12:10	12:48	13:37
58	04:59	06:02	06:54	12:24	13:04	13:54
56	04:47	05:48	06:40	12:37	13:18	14:08
54	04:36	05:36	06:28	12:48	13:30	14:20
52	04:27	05:25	06:17	12:58	13:40	14:30
50	04:18	05:16	06:07	13:07	13:50	14:40
45	03:60	04:56	05:48	13:25	14:10	14:59
40	03:45	04:41	05:31	13:40	14:26	15:16
35	03:33	04:27	05:18	13:53	14:39	15:29
30	03:22	04:15	05:06	14:04	14:51	15:41
20	03:03	03:55	04:45	14:24	15:12	16:01
10	02:47	03:38	04:28	14:40	15:29	16:19
0	02:32	03:22	04:11	14:56	15:46	16:35
-10	02:17	03:06	03:55	15:12	16:02	16:51
-20	02:01	02:48	03:37	15:29	16:20	17:09
-30	01:43	02:29	03:17	15:48	16:40	17:29
-35	01:33	02:17	03:05	15:59	16:52	17:40
-40	01:21	02:04	02:51	16:12	17:05	17:54
-45	01:06	01:48	02:35	16:27	17:21	18:10
-50	00:49	01:29	02:15	16:46	17:41	18:29
-52	00:41	01:20	02:06	16:55	17:51	18:38
-54	00:32	01:10	01:55	17:05	18:01	18:49
-56	00:22	00:58	01:43	17:17	18:13	19:00
-58	00:10	00:45	01:30	17:30	18:27	19:14
-60	–:–	00:30	01:13	17:45	18:43	19:29

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
31	13:19	13:23	12:13	08:44	21:08	25(17%)
1	13:28	13:32	12:13	09:33	21:58	26(10%)
2	13:36	13:40	12:13	10:23	22:47	27(5%)

February 03, 04 ,05 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	132°53.0	224°01.5	-20°57.7	112°25.9	8°57.6	235°44.8	-22°17.2	206°28.1	-22°07.5
1	147°55.5	239°00.9	-20°57.9	127°26.8	8°58.3	250°46.8	-22°17.2	221°30.3	-22°07.5
2	162°57.9	254°00.4	-20°58.0	142°27.7	8°58.9	265°48.8	-22°17.2	236°32.5	-22°07.5
3	178°00.4	268°59.8	-20°58.2	157°28.5	8°59.6	280°50.8	-22°17.3	251°34.6	-22°07.4
4	193°02.9	283°59.2	-20°58.4	172°29.4	9°00.3	295°52.8	-22°17.3	266°36.8	-22°07.4
5	208°05.3	298°58.6	-20°58.5	187°30.3	9°00.9	310°54.8	-22°17.4	281°39.0	-22°07.4
6	223°07.8	313°58.0	-20°58.7	202°31.2	9°01.6	325°56.8	-22°17.4	296°41.2	-22°07.3
7	238°10.2	328°57.5	-20°58.8	217°32.1	9°02.3	340°58.8	-22°17.4	311°43.3	-22°07.3
8	253°12.7	343°56.9	-20°59.0	232°33.0	9°02.9	356°00.8	-22°17.5	326°45.5	-22°07.3
9	268°15.2	358°56.3	-20°59.1	247°33.9	9°03.6	11°02.8	-22°17.5	341°47.7	-22°07.3
10	283°17.6	13°55.7	-20°59.3	262°34.8	9°04.3	26°04.8	-22°17.5	356°49.9	-22°07.2
11	298°20.1	28°55.1	-20°59.4	277°35.6	9°04.9	41°06.9	-22°17.6	11°52.0	-22°07.2
12	313°22.6	43°54.5	-20°59.6	292°36.5	9°05.6	56°08.9	-22°17.6	26°54.2	-22°07.2
13	328°25.0	58°54.0	-20°59.7	307°37.4	9°06.2	71°10.9	-22°17.7	41°56.4	-22°07.1
14	343°27.5	73°53.4	-20°59.9	322°38.3	9°06.9	86°12.9	-22°17.7	56°58.5	-22°07.1
15	358°30.0	88°52.8	-21°00.0	337°39.2	9°07.6	101°14.9	-22°17.7	72°00.7	-22°07.1
16	13°32.4	103°52.2	-21°00.2	352°40.1	9°08.2	116°16.9	-22°17.8	87°02.9	-22°07.1
17	28°34.9	118°51.6	-21°00.3	7°41.0	9°08.9	131°18.9	-22°17.8	102°05.1	-22°07.0
18	43°37.4	133°51.0	-21°00.5	22°41.8	9°09.6	146°20.9	-22°17.8	117°07.2	-22°07.0
19	58°39.8	148°50.5	-21°00.6	37°42.7	9°10.2	161°22.9	-22°17.9	132°09.4	-22°07.0
20	73°42.3	163°49.9	-21°00.8	52°43.6	9°10.9	176°25.0	-22°17.9	147°11.6	-22°06.9
21	88°44.7	178°49.3	-21°00.9	67°44.5	9°11.6	191°27.0	-22°17.9	162°13.8	-22°06.9
22	103°47.2	193°48.7	-21°01.1	82°45.4	9°12.2	206°29.0	-22°18.0	177°15.9	-22°06.9
23	118°49.7	208°48.1	-21°01.2	97°46.3	9°12.9	221°31.0	-22°18.0	192°18.1	-22°06.9
Mer.pass.:15:05		v-0.6 d-0.2 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	133°52.1	223°47.5	-21°01.3	112°47.2	9°13.5	236°33.0	-22°18.1	207°20.3	-22°06.8
1	148°54.6	238°46.9	-21°01.5	127°48.0	9°14.2	251°35.0	-22°18.1	222°22.5	-22°06.8
2	163°57.1	253°46.3	-21°01.6	142°48.9	9°14.9	266°37.0	-22°18.1	237°24.6	-22°06.8
3	178°59.5	268°45.8	-21°01.8	157°49.8	9°15.5	281°39.0	-22°18.2	252°26.8	-22°06.7
4	194°02.0	283°45.2	-21°01.9	172°50.7	9°16.2	296°41.0	-22°18.2	267°29.0	-22°06.7
5	209°04.5	298°44.6	-21°02.0	187°51.6	9°16.9	311°43.1	-22°18.2	282°31.2	-22°06.7
6	224°06.9	313°44.0	-21°02.2	202°52.5	9°17.5	326°45.1	-22°18.3	297°33.3	-22°06.7
7	239°09.4	328°43.4	-21°02.3	217°53.3	9°18.2	341°47.1	-22°18.3	312°35.5	-22°06.6
8	254°11.9	343°42.8	-21°02.4	232°54.2	9°18.8	356°49.1	-22°18.3	327°37.7	-22°06.6
9	269°14.3	358°42.2	-21°02.6	247°55.1	9°19.5	11°51.1	-22°18.4	342°39.9	-22°06.6
10	284°16.8	13°41.6	-21°02.7	262°56.0	9°20.2	26°53.1	-22°18.4	357°42.0	-22°06.5
11	299°19.2	28°41.0	-21°02.8	277°56.9	9°20.8	41°55.1	-22°18.5	12°44.2	-22°06.5
12	314°21.7	43°40.4	-21°02.9	292°57.8	9°21.5	56°57.2	-22°18.5	27°46.4	-22°06.5
13	329°24.2	58°39.9	-21°03.1	307°58.7	9°22.2	71°59.2	-22°18.5	42°48.6	-22°06.5
14	344°26.6	73°39.3	-21°03.2	322°59.5	9°22.8	87°01.2	-22°18.6	57°50.7	-22°06.4
15	359°29.1	88°38.7	-21°03.3	338°00.4	9°23.5	102°03.2	-22°18.6	72°52.9	-22°06.4
16	14°31.6	103°38.1	-21°03.5	353°01.3	9°24.1	117°05.2	-22°18.6	87°55.1	-22°06.4
17	29°34.0	118°37.5	-21°03.6	8°02.2	9°24.8	132°07.2	-22°18.7	102°57.3	-22°06.4
18	44°36.5	133°36.9	-21°03.7	23°03.1	9°25.5	147°09.2	-22°18.7	117°59.4	-22°06.3
19	59°39.0	148°36.3	-21°03.8	38°04.0	9°26.1	162°11.3	-22°18.7	133°01.6	-22°06.3
20	74°41.4	163°35.7	-21°03.9	53°04.8	9°26.8	177°13.3	-22°18.8	148°03.8	-22°06.3
21	89°43.9	178°35.1	-21°04.1	68°05.7	9°27.4	192°15.3	-22°18.8	163°06.0	-22°06.2
22	104°46.3	193°34.5	-21°04.2	83°06.6	9°28.1	207°17.3	-22°18.9	178°08.1	-22°06.2
23	119°48.8	208°33.9	-21°04.3	98°07.5	9°28.8	222°19.3	-22°18.9	193°10.3	-22°06.2
Mer.pass.:15:02		v-0.6 d-0.1 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	134°51.3	223°33.3	-21°04.4	113°08.4	9°29.4	237°21.3	-22°18.9	208°12.5	-22°06.2
1	149°53.7	238°32.7	-21°04.5	128°09.3	9°30.1	252°23.4	-22°19.0	223°14.7	-22°06.1
2	164°56.2	253°32.1	-21°04.7	143°10.1	9°30.7	267°25.4	-22°19.0	238°16.8	-22°06.1
3	179°58.7	268°31.5	-21°04.8	158°11.0	9°31.4	282°27.4	-22°19.0	253°19.0	-22°06.1
4	195°01.1	283°30.9	-21°04.9	173°11.9	9°32.1	297°29.4	-22°19.1	268°21.2	-22°06.0
5	210°03.6	298°30.3	-21°05.0	188°12.8	9°32.7	312°31.4	-22°19.1	283°23.4	-22°06.0
6	225°06.1	313°29.7	-21°05.1	203°13.7	9°33.4	327°33.4	-22°19.1	298°25.6	-22°06.0
7	240°08.5	328°29.1	-21°05.2	218°14.5	9°34.0	342°35.5	-22°19.2	313°27.7	-22°06.0
8	255°11.0	343°28.5	-21°05.3	233°15.4	9°34.7	357°37.5	-22°19.2	328°29.9	-22°05.9
9	270°13.5	358°27.9	-21°05.5	248°16.3	9°35.4	12°39.5	-22°19.2	343°32.1	-22°05.9
10	285°15.9	13°27.3	-21°05.6	263°17.2	9°36.0	27°41.5	-22°19.3	358°34.3	-22°05.9
11	300°18.4	28°26.7	-21°05.7	278°18.1	9°36.7	42°43.5	-22°19.3	13°36.4	-22°05.8
12	315°20.8	43°26.1	-21°05.8	293°19.0	9°37.3	57°45.6	-22°19.4	28°38.6	-22°05.8
13	330°23.3	58°25.5	-21°05.9	308°19.8	9°38.0	72°47.6	-22°19.4	43°40.8	-22°05.8
14	345°25.8	73°24.9	-21°06.0	323°20.7	9°38.6	87°49.6	-22°19.4	58°43.0	-22°05.8
15	0°28.2	88°24.3	-21°06.1	338°21.6	9°39.3	102°51.6	-22°19.5	73°45.1	-22°05.7
16	15°30.7	103°23.7	-21°06.2	353°22.5	9°40.0	117°53.6	-22°19.5	88°47.3	-22°05.7
17	30°33.2	118°23.1	-21°06.3	8°23.4	9°40.6	132°55.7	-22°19.5	103°49.5	-22°05.7
18	45°35.6	133°22.5	-21°06.4	23°24.2	9°41.3	147°57.7	-22°19.6	118°51.7	-22°05.6
19	60°38.1	148°21.9	-21°06.5	38°25.1	9°41.9	162°59.7	-22°19.6	133°53.9	-22°05.6
20	75°40.6	163°21.3	-21°06.6	53°26.0	9°42.6	178°01.7	-22°19.6	148°56.0	-22°05.6
21	90°43.0	178°20.7	-21°06.7	68°26.9	9°43.2	193°03.7	-22°19.7	163°58.2	-22°05.6
22	105°45.5	193°20.1	-21°06.8	83°27.8	9°43.9	208°05.8	-22°19.7	179°00.4	-22°05.5
23	120°48.0	208°19.5	-21°06.9	98°28.6	9°44.6	223°07.8	-22°19.7	194°02.6	-22°05.5
Mer.pass.:14:58		v-0.6 d-0.1 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.1	-42°12.5
Schedar	349°36.4	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.1	-57°08.8
Hamal	327°56.5	23°33.1
Polaris	316°03.4	89°20.9
Akamar	315°15.4	-40°14.1
Menkar	314°11.0	4°09.6
Mirfak	308°34.7	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.1	-8°11.1
Capella	280°28.5	46°01.0
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.0	-52°42.7
Sirius	258°29.9	-16°44.6
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.4
Suhail	222°49.2	-43°30.6
Miaplacidus	221°38.0	-69°47.7
Alphard	217°52.0	-8°44.6
Regulus	207°39.1	11°52.3
Dubhe	193°46.4	61°38.7
Denebola	182°29.4	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°04.6	-63°12.0
Gacrux	171°56.3	-57°12.9
Alioth	166°17.1	55°51.2
Spica	158°27.1	-11°15.5
Alcaid	152°55.7	49°12.9
Hadar	148°42.3	-60°27.5
Menkent	148°03.0	-36°27.6
Arcturus	145°52.0	19°05.2
Rigil Kent.	139°46.5	-60°54.4
Zubenelg.	137°01.2	-16°07.1
Kochab	137°20.1	74°04.4
Alphecca	126°07.8	26°39.0
Antares	112°21.7	-26°28.2
Atria	107°20.3	-69°03.3
Sabik	102°08.3	-15°44.8
Shaula	96°17.0	-37°06.8
Rasalhague	96°03.1	12°32.8
Etamin	90°44.7	51°29.1
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.7	38°48.0
Nunki	75°53.9	-26°16.3
Altair	62°04.9	8°55.1
Peacock	53°13.8	-56°40.4
Deneb	49°29.3	45°20.9
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.2
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/2/3	SHA	Mer.pass
Venus	91°08.5	09:04
Mars	339°32.9	16:29
Jupiter	102°51.8	08:16
Saturn	73°35.1	10:13

2019/2/4	SHA	Mer.pass
Venus	89°55.4	09:05
Mars	338°55.0	16:28
Jupiter	102°40.9	08:13
Saturn	73°28.2	10:09

2019/2/5	SHA	Mer.pass
Venus	88°42.0	09:06
Mars	338°17.1	16:26
Jupiter	102°30.1	08:09
Saturn	73°21.2	10:06

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°34.2	-16°40.1	197°31.5	11.6	-21°05.1	2.4	54.2
1	191°34.1	-16°39.3	212°02.1	11.6	-21°02.7	2.5	54.2
2	206°34.0	-16°38.6	226°32.8	11.7	-21°00.2	2.6	54.2
3	221°33.9	-16°37.9	241°03.4	11.7	-20°57.6	2.7	54.1
4	236°33.9	-16°37.2	255°34.2	11.7	-20°54.9	2.8	54.1
5	251°33.8	-16°36.4	270°04.9	11.8	-20°52.1	2.8	54.1
6	266°33.7	-16°35.7	284°35.7	11.8	-20°49.2	2.9	54.1
7	281°33.7	-16°35.0	299°06.5	11.8	-20°46.2	3.0	54.1
8	296°33.6	-16°34.2	313°37.3	11.8	-20°43.1	3.1	54.1
9	311°33.5	-16°33.5	328°08.1	11.9	-20°40.0	3.2	54.1
10	326°33.5	-16°32.8	342°39.0	11.9	-20°36.7	3.3	54.1
11	341°33.4	-16°32.0	357°09.9	11.9	-20°33.3	3.4	54.1
12	356°33.3	-16°31.3	11°40.9	12.0	-20°29.8	3.5	54.1
13	11°33.2	-16°30.5	26°11.8	12.0	-20°26.3	3.6	54.1
14	26°33.2	-16°29.8	40°42.8	12.0	-20°22.6	3.7	54.1
15	41°33.1	-16°29.1	55°13.9	12.0	-20°18.9	3.8	54.1
16	56°33.0	-16°28.3	69°44.9	12.1	-20°15.0	3.9	54.1
17	71°33.0	-16°27.6	84°16.0	12.1	-20°11.1	4.0	54.1
18	86°32.9	-16°26.9	98°47.1	12.1	-20°07.1	4.1	54.0
19	101°32.8	-16°26.1	113°18.3	12.2	-20°02.9	4.2	54.0
20	116°32.8	-16°25.4	127°49.5	12.2	-19°58.7	4.3	54.0
21	131°32.7	-16°24.6	142°20.7	12.2	-19°54.4	4.3	54.0
22	146°32.6	-16°23.9	156°52.0	12.3	-19°50.0	4.4	54.0
23	161°32.6	-16°23.2	171°23.3	12.3	-19°45.6	4.5	54.0
	SD.=16.2	d=0.7			S.D.=14.8		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°32.5	-16°22.4	185°54.6	12.3	-19°41.0	4.6	54.0
1	191°32.5	-16°21.7	200°26.0	12.4	-19°36.3	4.7	54.0
2	206°32.4	-16°20.9	214°57.4	12.4	-19°31.6	4.8	54.0
3	221°32.3	-16°20.2	229°28.8	12.5	-19°26.8	4.9	54.0
4	236°32.3	-16°19.4	244°00.3	12.5	-19°21.8	5.0	54.0
5	251°32.2	-16°18.7	258°31.8	12.5	-19°16.8	5.1	54.0
6	266°32.1	-16°18.0	273°03.3	12.6	-19°11.7	5.1	54.0
7	281°32.1	-16°17.2	287°34.9	12.6	-19°06.5	5.2	54.0
8	296°32.0	-16°16.5	302°06.5	12.6	-19°01.3	5.3	54.0
9	311°32.0	-16°15.7	316°38.2	12.7	-18°55.9	5.4	54.0
10	326°31.9	-16°15.0	331°09.8	12.7	-18°50.5	5.5	54.0
11	341°31.8	-16°14.2	345°41.6	12.7	-18°45.0	5.6	54.0
12	356°31.8	-16°13.5	0°13.3	12.8	-18°39.4	5.6	54.0
13	11°31.7	-16°12.7	14°45.1	12.8	-18°33.7	5.7	54.0
14	26°31.7	-16°12.0	29°17.0	12.9	-18°27.9	5.8	54.0
15	41°31.6	-16°11.2	43°48.8	12.9	-18°22.1	5.9	54.0
16	56°31.5	-16°10.5	58°20.7	12.9	-18°16.1	6.0	54.0
17	71°31.5	-16°09.7	72°52.7	13.0	-18°10.1	6.0	54.0
18	86°31.4	-16°09.0	87°24.7	13.0	-18°04.0	6.1	54.0
19	101°31.4	-16°08.2	101°56.7	13.0	-17°57.9	6.2	53.9
20	116°31.3	-16°07.5	116°28.8	13.1	-17°51.6	6.3	53.9
21	131°31.2	-16°06.7	131°00.9	13.1	-17°45.3	6.4	53.9
22	146°31.2	-16°06.0	145°33.0	13.2	-17°38.9	6.4	53.9
23	161°31.1	-16°05.2	160°05.2	13.2	-17°32.4	6.5	53.9
	SD.=16.2	d=0.7			S.D.=14.7		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°31.1	-16°04.5	174°37.4	13.2	-17°25.9	6.6	53.9
1	191°31.0	-16°03.7	189°09.6	13.3	-17°19.2	6.7	53.9
2	206°31.0	-16°03.0	203°41.9	13.3	-17°12.5	6.7	53.9
3	221°30.9	-16°02.2	218°14.3	13.3	-17°05.7	6.8	53.9
4	236°30.9	-16°01.5	232°46.6	13.4	-16°58.9	6.9	53.9
5	251°30.8	-16°00.7	247°19.0	13.4	-16°52.0	7.0	53.9
6	266°30.7	-15°59.9	261°51.5	13.5	-16°45.0	7.0	53.9
7	281°30.7	-15°59.2	276°24.0	13.5	-16°37.9	7.1	53.9
8	296°30.6	-15°58.4	290°56.5	13.5	-16°30.7	7.2	53.9
9	311°30.6	-15°57.7	305°29.0	13.6	-16°23.5	7.3	53.9
10	326°30.5	-15°56.9	320°01.6	13.6	-16°16.2	7.3	53.9
11	341°30.5	-15°56.2	334°34.3	13.7	-16°08.9	7.4	53.9
12	356°30.4	-15°55.4	349°06.9	13.7	-16°01.4	7.5	53.9
13	11°30.4	-15°54.6	3°39.6	13.7	-15°54.0	7.5	53.9
14	26°30.3	-15°53.9	18°12.4	13.8	-15°46.4	7.6	53.9
15	41°30.3	-15°53.1	32°45.2	13.8	-15°38.8	7.7	53.9
16	56°30.2	-15°52.4	47°18.0	13.8	-15°31.1	7.7	53.9
17	71°30.2	-15°51.6	61°50.8	13.9	-15°23.3	7.8	53.9
18	86°30.1	-15°50.8	76°23.7	13.9	-15°15.5	7.9	53.9
19	101°30.1	-15°50.1	90°56.7	13.9	-15°07.6	7.9	53.9
20	116°30.0	-15°49.3	105°29.6	14.0	-14°59.6	8.0	53.9
21	131°30.0	-15°48.5	120°02.6	14.0	-14°51.6	8.1	53.9
22	146°29.9	-15°47.8	134°35.7	14.1	-14°43.5	8.1	53.9
23	161°29.9	-15°47.0	149°08.7	14.1	-14°35.4	8.2	53.9
	SD.=16.2	d=0.8			S.D.=14.7		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:60	08:26	10:06	14:23	16:03	17:30
70	06:53	08:10	09:31	14:58	16:20	17:36
68	06:47	07:56	09:06	15:23	16:33	17:42
66	06:42	07:45	08:47	15:42	16:44	17:47
64	06:38	07:36	08:31	15:58	16:53	17:51
62	06:34	07:28	08:18	16:10	17:01	17:55
60	06:31	07:21	08:07	16:21	17:08	17:58
58	06:27	07:15	07:58	16:31	17:14	18:01
56	06:24	07:09	07:50	16:39	17:20	18:04
54	06:22	07:04	07:42	16:46	17:25	18:07
52	06:19	06:59	07:36	16:53	17:29	18:10
50	06:16	06:55	07:30	16:59	17:33	18:12
45	06:11	06:46	07:17	17:12	17:43	18:18
40	06:05	06:38	07:06	17:22	17:51	18:23
35	06:00	06:30	06:57	17:31	17:58	18:28
30	05:55	06:24	06:49	17:39	18:04	18:33
20	05:45	06:12	06:35	17:53	18:16	18:43
10	05:35	06:00	06:22	18:06	18:28	18:53
0	05:24	05:49	06:10	18:17	18:39	19:04
-10	05:11	05:37	05:58	18:29	18:51	19:17
-20	04:55	05:22	05:46	18:42	19:05	19:32
-30	04:35	05:05	05:31	18:56	19:22	19:52
-35	04:22	04:55	05:22	19:05	19:32	20:05
-40	04:06	04:43	05:12	19:15	19:44	20:21
-45	03:47	04:28	05:01	19:26	19:59	20:40
-50	03:21	04:09	04:46	19:40	20:18	21:06
-52	03:07	03:60	04:40	19:47	20:26	21:18
-54	02:52	03:50	04:32	19:54	20:36	21:34
-56	02:33	03:38	04:24	20:02	20:48	21:52
-58	02:08	03:24	04:15	20:12	21:01	22:16
-60	01:33	03:08	04:04	20:22	21:17	22:49

		Moonrise			**Moonset**	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	10:56	–:–	–:–	14:47
70	–:–	10:36	10:15	–:–	13:32	15:28
68	09:46	09:48	09:46	12:42	14:19	15:56
66	09:01	09:17	09:25	13:28	14:50	16:16
64	08:31	08:53	09:08	13:57	15:13	16:33
62	08:08	08:35	08:53	14:20	15:31	16:46
60	07:50	08:19	08:41	14:38	15:46	16:58
58	07:35	08:06	08:31	14:53	15:58	17:08
56	07:22	07:55	08:22	15:05	16:09	17:16
54	07:10	07:45	08:13	15:16	16:19	17:24
52	07:00	07:36	08:06	15:26	16:27	17:31
50	06:51	07:28	07:60	15:35	16:35	17:37
45	06:33	07:12	07:45	15:54	16:51	17:50
40	06:17	06:58	07:34	16:09	17:04	18:01
35	06:04	06:46	07:24	16:21	17:15	18:10
30	05:53	06:36	07:15	16:33	17:25	18:18
20	05:33	06:18	06:60	16:51	17:42	18:32
10	05:16	06:02	06:46	17:08	17:57	18:44
0	05:00	05:48	06:34	17:23	18:10	18:56
-10	04:44	05:33	06:21	17:39	18:24	19:07
-20	04:27	05:18	06:08	17:55	18:38	19:19
-30	04:07	04:60	05:53	18:14	18:55	19:33
-35	03:56	04:49	05:44	18:25	19:04	19:40
-40	03:43	04:37	05:34	18:37	19:15	19:49
-45	03:27	04:23	05:22	18:52	19:28	19:60
-50	03:08	04:06	05:07	19:10	19:43	20:12
-52	02:59	03:58	05:00	19:18	19:51	20:18
-54	02:49	03:48	04:52	19:27	19:59	20:24
-56	02:37	03:38	04:44	19:38	20:08	20:31
-58	02:24	03:26	04:34	19:50	20:18	20:39
-60	02:08	03:13	04:23	20:04	20:29	20:48

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	13:43	13:47	12:13	11:11	23:35	28(2%)
4	13:50	13:53	12:13	11:59	00:22	29(0%)
5	13:56	13:58	12:13	12:44	00:22	1(0%)

February 06, 07 ,08 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	135°50.4	223°18.9	-21°07.0	113°29.5	9°45.2	238°09.8	-22°19.8	209°04.7	-22°05.5
1	150°52.9	238°18.3	-21°07.1	128°30.4	9°45.9	253°11.8	-22°19.8	224°06.9	-22°05.4
2	165°55.3	253°17.7	-21°07.2	143°31.3	9°46.5	268°13.8	-22°19.8	239°09.1	-22°05.4
3	180°57.8	268°17.1	-21°07.3	158°32.2	9°47.2	283°15.9	-22°19.9	254°11.3	-22°05.4
4	196°00.3	283°16.5	-21°07.4	173°33.0	9°47.8	298°17.9	-22°19.9	269°13.5	-22°05.4
5	211°02.7	298°15.9	-21°07.5	188°33.9	9°48.5	313°19.9	-22°19.9	284°15.6	-22°05.3
6	226°05.2	313°15.3	-21°07.5	203°34.8	9°49.2	328°21.9	-22°20.0	299°17.8	-22°05.3
7	241°07.7	328°14.7	-21°07.6	218°35.7	9°49.8	343°24.0	-22°20.0	314°20.0	-22°05.3
8	256°10.1	343°14.1	-21°07.7	233°36.6	9°50.5	358°26.0	-22°20.1	329°22.2	-22°05.2
9	271°12.6	358°13.5	-21°07.8	248°37.4	9°51.1	13°28.0	-22°20.1	344°24.3	-22°05.2
10	286°15.1	13°12.8	-21°07.9	263°38.3	9°51.8	28°30.0	-22°20.1	359°26.5	-22°05.2
11	301°17.5	28°12.2	-21°08.0	278°39.2	9°52.4	43°32.0	-22°20.2	14°28.7	-22°05.2
12	316°20.0	43°11.6	-21°08.1	293°40.1	9°53.1	58°34.1	-22°20.2	29°30.9	-22°05.1
13	331°22.4	58°11.0	-21°08.2	308°41.0	9°53.7	73°36.1	-22°20.2	44°33.1	-22°05.1
14	346°24.9	73°10.4	-21°08.2	323°41.8	9°54.4	88°38.1	-22°20.3	59°35.2	-22°05.1
15	1°27.4	88°09.8	-21°08.3	338°42.7	9°55.1	103°40.1	-22°20.3	74°37.4	-22°05.0
16	16°29.8	103°09.2	-21°08.4	353°43.6	9°55.7	118°42.2	-22°20.3	89°39.6	-22°05.0
17	31°32.3	118°08.6	-21°08.5	8°44.5	9°56.4	133°44.2	-22°20.4	104°41.8	-22°05.0
18	46°34.8	133°08.0	-21°08.6	23°45.4	9°57.0	148°46.2	-22°20.4	119°44.0	-22°05.0
19	61°37.2	148°07.4	-21°08.6	38°46.2	9°57.7	163°48.2	-22°20.4	134°46.1	-22°04.9
20	76°39.7	163°06.8	-21°08.7	53°47.1	9°58.3	178°50.3	-22°20.5	149°48.3	-22°04.9
21	91°42.2	178°06.1	-21°08.8	68°48.0	9°59.0	193°52.3	-22°20.5	164°50.5	-22°04.9
22	106°44.6	193°05.5	-21°08.9	83°48.9	9°59.6	208°54.3	-22°20.5	179°52.7	-22°04.8
23	121°47.1	208°04.9	-21°08.9	98°49.8	10°00.3	223°56.3	-22°20.6	194°54.9	-22°04.8
Mer.pass.:14:54		v-0.6 d-0.1 m-4.1		v0.9 d0.7 m0.9		v2.0 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	136°49.6	223°04.3	-21°09.0	113°50.6	10°00.9	238°58.4	-22°20.6	209°57.0	-22°04.8
1	151°52.0	238°03.7	-21°09.1	128°51.5	10°01.6	254°00.4	-22°20.6	224°59.2	-22°04.8
2	166°54.5	253°03.1	-21°09.2	143°52.4	10°02.2	269°02.4	-22°20.7	240°01.4	-22°04.7
3	181°56.9	268°02.5	-21°09.2	158°53.3	10°02.9	284°04.4	-22°20.7	255°03.6	-22°04.7
4	196°59.4	283°01.9	-21°09.3	173°54.1	10°03.5	299°06.5	-22°20.7	270°05.8	-22°04.7
5	212°01.9	298°01.2	-21°09.4	188°55.0	10°04.2	314°08.5	-22°20.8	285°07.9	-22°04.6
6	227°04.3	313°00.6	-21°09.4	203°55.9	10°04.9	329°10.5	-22°20.8	300°10.1	-22°04.6
7	242°06.8	328°00.0	-21°09.5	218°56.8	10°05.5	344°12.6	-22°20.8	315°12.3	-22°04.6
8	257°09.3	342°59.4	-21°09.6	233°57.6	10°06.2	359°14.6	-22°20.9	330°14.5	-22°04.6
9	272°11.7	357°58.8	-21°09.6	248°58.5	10°06.8	14°16.6	-22°20.9	345°16.7	-22°04.5
10	287°14.2	12°58.2	-21°09.7	263°59.4	10°07.5	29°18.6	-22°20.9	0°18.8	-22°04.5
11	302°16.7	27°57.6	-21°09.8	279°00.3	10°08.1	44°20.7	-22°21.0	15°21.0	-22°04.5
12	317°19.1	42°56.9	-21°09.8	294°01.2	10°08.8	59°22.7	-22°21.0	30°23.2	-22°04.4
13	332°21.6	57°56.3	-21°09.9	309°02.0	10°09.4	74°24.7	-22°21.0	45°25.4	-22°04.4
14	347°24.0	72°55.7	-21°09.9	324°02.9	10°10.1	89°26.8	-22°21.1	60°27.6	-22°04.4
15	2°26.5	87°55.1	-21°10.0	339°03.8	10°10.7	104°28.8	-22°21.1	75°29.7	-22°04.4
16	17°29.0	102°54.5	-21°10.1	354°04.7	10°11.4	119°30.8	-22°21.1	90°31.9	-22°04.3
17	32°31.4	117°53.9	-21°10.1	9°05.5	10°12.0	134°32.8	-22°21.2	105°34.1	-22°04.3
18	47°33.9	132°53.2	-21°10.2	24°06.4	10°12.7	149°34.9	-22°21.2	120°36.3	-22°04.3
19	62°36.4	147°52.6	-21°10.2	39°07.3	10°13.3	164°36.9	-22°21.2	135°38.5	-22°04.2
20	77°38.8	162°52.0	-21°10.3	54°08.2	10°14.0	179°38.9	-22°21.3	150°40.6	-22°04.2
21	92°41.3	177°51.4	-21°10.3	69°09.0	10°14.6	194°41.0	-22°21.3	165°42.8	-22°04.2
22	107°43.8	192°50.8	-21°10.4	84°09.9	10°15.3	209°43.0	-22°21.3	180°45.0	-22°04.2
23	122°46.2	207°50.2	-21°10.4	99°10.8	10°15.9	224°45.0	-22°21.4	195°47.2	-22°04.1
Mer.pass.:14:50		v-0.6 d-0.1 m-4.1		v0.9 d0.7 m1.0		v2.0 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	137°48.7	222°49.5	-21°10.5	114°11.7	10°16.6	239°47.1	-22°21.4	210°49.4	-22°04.1
1	152°51.2	237°48.9	-21°10.5	129°12.5	10°17.2	254°49.1	-22°21.4	225°51.6	-22°04.1
2	167°53.6	252°48.3	-21°10.6	144°13.4	10°17.9	269°51.1	-22°21.5	240°53.7	-22°04.0
3	182°56.1	267°47.7	-21°10.6	159°14.3	10°18.5	284°53.1	-22°21.5	255°55.9	-22°04.0
4	197°58.5	282°47.1	-21°10.7	174°15.2	10°19.2	299°55.2	-22°21.5	270°58.1	-22°04.0
5	213°01.0	297°46.4	-21°10.7	189°16.0	10°19.8	314°57.2	-22°21.6	286°00.3	-22°04.0
6	228°03.5	312°45.8	-21°10.8	204°16.9	10°20.5	329°59.2	-22°21.6	301°02.5	-22°03.9
7	243°05.9	327°45.2	-21°10.8	219°17.8	10°21.1	345°01.3	-22°21.6	316°04.6	-22°03.9
8	258°08.4	342°44.6	-21°10.9	234°18.7	10°21.8	0°03.3	-22°21.7	331°06.8	-22°03.9
9	273°10.9	357°44.0	-21°10.9	249°19.5	10°22.4	15°05.3	-22°21.7	346°09.0	-22°03.8
10	288°13.3	12°43.3	-21°10.9	264°20.4	10°23.1	30°07.4	-22°21.7	1°11.2	-22°03.8
11	303°15.8	27°42.7	-21°11.0	279°21.3	10°23.7	45°09.4	-22°21.8	16°13.4	-22°03.8
12	318°18.3	42°42.1	-21°11.0	294°22.2	10°24.4	60°11.4	-22°21.8	31°15.6	-22°03.8
13	333°20.7	57°41.5	-21°11.1	309°23.0	10°25.0	75°13.5	-22°21.8	46°17.7	-22°03.7
14	348°23.2	72°40.8	-21°11.1	324°23.9	10°25.7	90°15.5	-22°21.9	61°19.9	-22°03.7
15	3°25.7	87°40.2	-21°11.1	339°24.8	10°26.3	105°17.5	-22°21.9	76°22.1	-22°03.7
16	18°28.1	102°39.6	-21°11.2	354°25.7	10°26.9	120°19.6	-22°21.9	91°24.3	-22°03.6
17	33°30.6	117°39.0	-21°11.2	9°26.5	10°27.6	135°21.6	-22°22.0	106°26.5	-22°03.6
18	48°33.0	132°38.4	-21°11.2	24°27.4	10°28.2	150°23.6	-22°22.0	121°28.7	-22°03.6
19	63°35.5	147°37.7	-21°11.3	39°28.3	10°28.9	165°25.7	-22°22.0	136°30.8	-22°03.6
20	78°38.0	162°37.1	-21°11.3	54°29.2	10°29.5	180°27.7	-22°22.1	151°33.0	-22°03.5
21	93°40.4	177°36.5	-21°11.3	69°30.0	10°30.2	195°29.7	-22°22.1	166°35.2	-22°03.5
22	108°42.9	192°35.9	-21°11.4	84°30.9	10°30.8	210°31.8	-22°22.1	181°37.4	-22°03.5
23	123°45.4	207°35.2	-21°11.4	99°31.8	10°31.5	225°33.8	-22°22.2	196°39.6	-22°03.4
Mer.pass.:14:46		v-0.6 d-0.0 m-4.1		v0.9 d0.6 m1.0		v2.0 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.1	-42°12.5
Schedar	349°36.4	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.1	-57°08.8
Hamal	327°56.5	23°33.1
Polaris	316°05.0	89°20.9
Akamar	315°15.4	-40°14.1
Menkar	314°11.0	4°09.6
Mirfak	308°34.7	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.5	46°01.0
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.3	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.0	-52°42.7
Sirius	258°29.9	-16°44.6
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.4
Suhail	222°49.2	-43°30.7
Miaplacidus	221°38.0	-69°47.7
Alphard	217°52.0	-8°44.6
Regulus	207°39.1	11°52.3
Dubhe	193°46.4	61°38.7
Denebola	182°29.4	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°04.5	-63°12.0
Gacrux	171°56.2	-57°12.9
Alioth	166°17.0	55°51.2
Spica	158°27.0	-11°15.5
Alcaid	152°55.7	49°12.9
Hadar	148°42.2	-60°27.5
Menkent	148°02.9	-36°27.6
Arcturus	145°52.0	19°05.2
Rigil Kent.	139°46.4	-60°54.4
Zubenelg.	137°01.1	-16°07.1
Kochab	137°20.1	74°04.4
Alphecca	126°07.8	26°39.0
Antares	112°21.7	-26°28.2
Atria	107°20.3	-69°03.3
Sabik	102°08.3	-15°44.8
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.1	12°32.8
Etamin	90°44.7	51°29.1
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.7	38°48.0
Nunki	75°53.9	-26°16.3
Altair	62°04.9	8°55.0
Peacock	53°13.8	-56°40.3
Deneb	49°29.3	45°20.9
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.2
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/2/6	**SHA**	**Mer.pass**
Venus	87°28.5	09:07
Mars	337°39.1	16:25
Jupiter	102°19.4	08:06
Saturn	73°14.3	10:02

2019/2/7	**SHA**	**Mer.pass**
Venus	86°14.8	09:08
Mars	337°01.1	16:24
Jupiter	102°08.8	08:03
Saturn	73°07.5	09:59

2019/2/8	**SHA**	**Mer.pass**
Venus	85°00.8	09:09
Mars	336°23.0	16:22
Jupiter	101°58.4	07:60
Saturn	73°00.7	09:55

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	176°29.8	-15°46.3	163°41.8	14.1	-14°27.2	8.2	53.9
1	191°29.8	-15°45.5	178°15.0	14.2	-14°18.9	8.3	54.0
2	206°29.7	-15°44.7	192°48.2	14.2	-14°10.6	8.4	54.0
3	221°29.7	-15°44.0	207°21.4	14.2	-14°02.2	8.4	54.0
4	236°29.6	-15°43.2	221°54.6	14.3	-13°53.7	8.5	54.0
5	251°29.6	-15°42.4	236°27.9	14.3	-13°45.2	8.5	54.0
6	266°29.6	-15°41.7	251°01.2	14.3	-13°36.7	8.6	54.0
7	281°29.5	-15°40.9	265°34.5	14.4	-13°28.0	8.6	54.0
8	296°29.5	-15°40.1	280°07.9	14.4	-13°19.4	8.7	54.0
9	311°29.4	-15°39.4	294°41.3	14.4	-13°10.6	8.8	54.0
10	326°29.4	-15°38.6	309°14.8	14.5	-13°01.8	8.8	54.0
11	341°29.3	-15°37.8	323°48.3	14.5	-12°53.0	8.9	54.0
12	356°29.3	-15°37.0	338°21.8	14.5	-12°44.1	8.9	54.0
13	11°29.2	-15°36.3	352°55.3	14.6	-12°35.1	9.0	54.0
14	26°29.2	-15°35.5	7°28.9	14.6	-12°26.1	9.0	54.0
15	41°29.2	-15°34.7	22°02.5	14.6	-12°17.1	9.1	54.0
16	56°29.1	-15°34.0	36°36.1	14.6	-12°08.0	9.1	54.0
17	71°29.1	-15°33.2	51°09.8	14.7	-11°58.8	9.2	54.0
18	86°29.0	-15°32.4	65°43.5	14.7	-11°49.6	9.2	54.0
19	101°29.0	-15°31.6	80°17.2	14.7	-11°40.4	9.3	54.0
20	116°29.0	-15°30.9	94°50.9	14.8	-11°31.0	9.3	54.0
21	131°28.9	-15°30.1	109°24.7	14.8	-11°21.7	9.4	54.0
22	146°28.9	-15°29.3	123°58.5	14.8	-11°12.3	9.4	54.0
23	161°28.8	-15°28.5	138°32.3	14.8	-11°02.8	9.5	54.0
	SD.=16.2	d=0.8			S.D.=14.7		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	176°28.8	-15°27.8	153°06.2	14.9	-10°53.3	9.5	54.0
1	191°28.8	-15°27.0	167°40.1	14.9	-10°43.8	9.6	54.1
2	206°28.7	-15°26.2	182°14.0	14.9	-10°34.2	9.6	54.1
3	221°28.7	-15°25.4	196°47.9	14.9	-10°24.6	9.7	54.1
4	236°28.6	-15°24.7	211°21.9	15.0	-10°14.9	9.7	54.1
5	251°28.6	-15°23.9	225°55.8	15.0	-10°05.2	9.7	54.1
6	266°28.6	-15°23.1	240°29.8	15.0	-9°55.4	9.8	54.1
7	281°28.5	-15°22.3	255°03.9	15.0	-9°45.6	9.8	54.1
8	296°28.5	-15°21.5	269°37.9	15.1	-9°35.8	9.9	54.1
9	311°28.5	-15°20.8	284°12.0	15.1	-9°25.9	9.9	54.1
10	326°28.4	-15°20.0	298°46.1	15.1	-9°16.0	9.9	54.1
11	341°28.4	-15°19.2	313°20.2	15.1	-9°06.0	10.0	54.1
12	356°28.4	-15°18.4	327°54.3	15.1	-8°56.0	10.0	54.1
13	11°28.3	-15°17.6	342°28.5	15.2	-8°45.9	10.1	54.1
14	26°28.3	-15°16.9	357°02.7	15.2	-8°35.9	10.1	54.1
15	41°28.2	-15°16.1	11°36.9	15.2	-8°25.8	10.1	54.2
16	56°28.2	-15°15.3	26°11.1	15.2	-8°15.6	10.2	54.2
17	71°28.2	-15°14.5	40°45.3	15.2	-8°05.4	10.2	54.2
18	86°28.1	-15°13.7	55°19.5	15.3	-7°55.2	10.2	54.2
19	101°28.1	-15°12.9	69°53.8	15.3	-7°44.9	10.3	54.2
20	116°28.1	-15°12.2	84°28.1	15.3	-7°34.6	10.3	54.2
21	131°28.1	-15°11.4	99°02.4	15.3	-7°24.3	10.3	54.2
22	146°28.0	-15°10.6	113°36.7	15.3	-7°14.0	10.4	54.2
23	161°28.0	-15°09.8	128°11.0	15.3	-7°03.6	10.4	54.2
	SD.=16.2	d=0.8			S.D.=14.7		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	176°28.0	-15°09.0	142°45.3	15.3	-6°53.1	10.4	54.2
1	191°27.9	-15°08.2	157°19.7	15.3	-6°42.7	10.5	54.3
2	206°27.9	-15°07.4	171°54.0	15.4	-6°32.2	10.5	54.3
3	221°27.9	-15°06.7	186°28.4	15.4	-6°21.7	10.5	54.3
4	236°27.8	-15°05.9	201°02.8	15.4	-6°11.2	10.6	54.3
5	251°27.8	-15°05.1	215°37.1	15.4	-6°00.6	10.6	54.3
6	266°27.8	-15°04.3	230°11.5	15.4	-5°50.0	10.6	54.3
7	281°27.8	-15°03.5	244°45.9	15.4	-5°39.4	10.6	54.3
8	296°27.7	-15°02.7	259°20.4	15.4	-5°28.7	10.7	54.3
9	311°27.7	-15°01.9	273°54.8	15.4	-5°18.1	10.7	54.3
10	326°27.7	-15°01.1	288°29.2	15.4	-5°07.4	10.7	54.4
11	341°27.6	-15°00.3	303°03.6	15.4	-4°56.6	10.7	54.4
12	356°27.6	-14°59.5	317°38.1	15.4	-4°45.9	10.8	54.4
13	11°27.6	-14°58.7	332°12.5	15.4	-4°35.1	10.8	54.4
14	26°27.6	-14°58.0	346°47.0	15.4	-4°24.3	10.8	54.4
15	41°27.5	-14°57.2	1°21.4	15.4	-4°13.5	10.8	54.4
16	56°27.5	-14°56.4	15°55.8	15.4	-4°02.7	10.8	54.4
17	71°27.5	-14°55.6	30°30.3	15.4	-3°51.8	10.9	54.4
18	86°27.5	-14°54.8	45°04.7	15.4	-3°40.9	10.9	54.5
19	101°27.4	-14°54.0	59°39.2	15.4	-3°30.1	10.9	54.5
20	116°27.4	-14°53.2	74°13.6	15.4	-3°19.1	10.9	54.5
21	131°27.4	-14°52.4	88°48.1	15.4	-3°08.2	10.9	54.5
22	146°27.4	-14°51.6	103°22.5	15.4	-2°57.3	11.0	54.5
23	161°27.3	-14°50.8	117°57.0	15.4	-2°46.3	11.0	54.5
	SD.=16.2	d=0.8			S.D.=14.8		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:48	08:13	09:45	14:45	16:17	17:42
70	06:43	07:58	09:15	15:15	16:32	17:47
68	06:38	07:46	08:53	15:36	16:43	17:51
66	06:34	07:36	08:36	15:54	16:53	17:55
64	06:31	07:28	08:22	16:08	17:01	17:59
62	06:27	07:21	08:10	16:19	17:09	18:02
60	06:24	07:14	07:60	16:29	17:15	18:05
58	06:22	07:09	07:51	16:38	17:21	18:07
56	06:19	07:03	07:44	16:46	17:26	18:10
54	06:17	06:59	07:37	16:52	17:30	18:12
52	06:15	06:55	07:30	16:58	17:34	18:14
50	06:12	06:51	07:25	17:04	17:38	18:17
45	06:07	06:42	07:13	17:16	17:47	18:22
40	06:03	06:35	07:03	17:26	17:54	18:26
35	05:58	06:28	06:54	17:34	18:01	18:31
30	05:53	06:22	06:47	17:42	18:07	18:35
20	05:44	06:11	06:33	17:55	18:18	18:44
10	05:35	05:60	06:22	18:07	18:28	18:53
0	05:24	05:49	06:11	18:18	18:39	19:04
-10	05:12	05:38	05:59	18:29	18:50	19:16
-20	04:57	05:24	05:47	18:41	19:04	19:31
-30	04:38	05:08	05:33	18:54	19:20	19:50
-35	04:26	04:58	05:25	19:02	19:29	20:02
-40	04:11	04:47	05:16	19:12	19:41	20:17
-45	03:52	04:33	05:05	19:22	19:55	20:35
-50	03:28	04:15	04:52	19:35	20:12	20:59
-52	03:15	04:06	04:45	19:42	20:20	21:11
-54	03:01	03:57	04:39	19:48	20:30	21:25
-56	02:44	03:46	04:31	19:56	20:41	21:42
-58	02:22	03:33	04:22	20:05	20:53	22:03
-60	01:52	03:18	04:12	20:14	21:08	22:31

	Moonrise			Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	10:26	10:07	09:51	16:50	18:39	20:22
70	10:02	09:53	09:44	17:12	18:51	20:27
68	09:44	09:41	09:38	17:29	19:01	20:31
66	09:29	09:32	09:33	17:43	19:09	20:34
64	09:17	09:24	09:29	17:54	19:16	20:37
62	09:07	09:17	09:25	18:04	19:21	20:39
60	08:58	09:11	09:22	18:12	19:26	20:41
58	08:50	09:06	09:19	18:19	19:31	20:43
56	08:43	09:01	09:17	18:25	19:35	20:45
54	08:37	08:57	09:14	18:31	19:38	20:46
52	08:31	08:53	09:12	18:36	19:42	20:48
50	08:26	08:49	09:10	18:40	19:44	20:49
45	08:15	08:42	09:06	18:50	19:51	20:51
40	08:06	08:35	09:03	18:58	19:56	20:54
35	07:58	08:30	08:60	19:05	20:00	20:55
30	07:51	08:25	08:57	19:11	20:04	20:57
20	07:39	08:16	08:52	19:22	20:11	20:60
10	07:29	08:09	08:48	19:31	20:17	21:02
0	07:19	08:02	08:44	19:40	20:22	21:05
-10	07:09	07:55	08:40	19:48	20:28	21:07
-20	06:58	07:47	08:36	19:57	20:34	21:09
-30	06:46	07:39	08:31	20:07	20:40	21:12
-35	06:39	07:34	08:29	20:13	20:44	21:13
-40	06:31	07:28	08:26	20:20	20:48	21:15
-45	06:21	07:21	08:22	20:28	20:53	21:17
-50	06:10	07:14	08:18	20:37	20:59	21:19
-52	06:04	07:10	08:16	20:41	21:02	21:21
-54	05:59	07:06	08:14	20:46	21:05	21:22
-56	05:52	07:01	08:11	20:51	21:08	21:23
-58	05:45	06:56	08:08	20:57	21:11	21:24
-60	05:36	06:51	08:05	21:03	21:15	21:26

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	14:01	14:03	12:14	13:29	01:07	2(2%)
7	14:05	14:07	12:14	14:12	01:50	3(6%)
8	14:08	14:10	12:14	14:54	02:33	4(11%)

February 09, 10 ,11 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	138°47.8	222°34.6	-21°11.4	114°32.7	10°32.1	240°35.9	-22°22.2	211°41.8	-22°03.4
1	153°50.3	237°34.0	-21°11.5	129°33.5	10°32.8	255°37.9	-22°22.2	226°43.9	-22°03.4
2	168°52.8	252°33.4	-21°11.5	144°34.4	10°33.4	270°39.9	-22°22.2	241°46.1	-22°03.4
3	183°55.2	267°32.7	-21°11.5	159°35.3	10°34.1	285°42.0	-22°22.3	256°48.3	-22°03.3
4	198°57.7	282°32.1	-21°11.5	174°36.1	10°34.7	300°44.0	-22°22.3	271°50.5	-22°03.3
5	214°00.1	297°31.5	-21°11.5	189°37.0	10°35.4	315°46.0	-22°22.3	286°52.7	-22°03.3
6	229°02.6	312°30.8	-21°11.6	204°37.9	10°36.0	330°48.1	-22°22.4	301°54.9	-22°03.2
7	244°05.1	327°30.2	-21°11.6	219°38.8	10°36.6	345°50.1	-22°22.4	316°57.0	-22°03.2
8	259°07.5	342°29.6	-21°11.6	234°39.6	10°37.3	0°52.1	-22°22.4	331°59.2	-22°03.2
9	274°10.0	357°29.0	-21°11.6	249°40.5	10°37.9	15°54.2	-22°22.5	347°01.4	-22°03.2
10	289°12.5	12°28.3	-21°11.6	264°41.4	10°38.6	30°56.2	-22°22.5	2°03.6	-22°03.1
11	304°14.9	27°27.7	-21°11.7	279°42.2	10°39.2	45°58.3	-22°22.5	17°05.8	-22°03.1
12	319°17.4	42°27.1	-21°11.7	294°43.1	10°39.9	61°00.3	-22°22.6	32°08.0	-22°03.1
13	334°19.9	57°26.5	-21°11.7	309°44.0	10°40.5	76°02.3	-22°22.6	47°10.2	-22°03.0
14	349°22.3	72°25.8	-21°11.7	324°44.9	10°41.2	91°04.4	-22°22.6	62°12.3	-22°03.0
15	4°24.8	87°25.2	-21°11.7	339°45.7	10°41.8	106°06.4	-22°22.7	77°14.5	-22°03.0
16	19°27.3	102°24.6	-21°11.7	354°46.6	10°42.4	121°08.5	-22°22.7	92°16.7	-22°03.0
17	34°29.7	117°23.9	-21°11.7	9°47.5	10°43.1	136°10.5	-22°22.7	107°18.9	-22°02.9
18	49°32.2	132°23.3	-21°11.8	24°48.3	10°43.7	151°12.5	-22°22.8	122°21.1	-22°02.9
19	64°34.6	147°22.7	-21°11.8	39°49.2	10°44.4	166°14.6	-22°22.8	137°23.3	-22°02.9
20	79°37.1	162°22.0	-21°11.8	54°50.1	10°45.0	181°16.6	-22°22.8	152°25.4	-22°02.8
21	94°39.6	177°21.4	-21°11.8	69°51.0	10°45.7	196°18.6	-22°22.9	167°27.6	-22°02.8
22	109°42.0	192°20.8	-21°11.8	84°51.8	10°46.3	211°20.7	-22°22.9	182°29.8	-22°02.8
23	124°44.5	207°20.2	-21°11.8	99°52.7	10°46.9	226°22.7	-22°22.9	197°32.0	-22°02.8
Mer.pass.:14:42		v-0.6 d-0.0 m-4.1		v0.9 d0.6 m1.0		v2.0 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	139°47.0	222°19.5	-21°11.8	114°53.6	10°47.6	241°24.8	-22°22.9	212°34.2	-22°02.7
1	154°49.4	237°18.9	-21°11.8	129°54.4	10°48.2	256°26.8	-22°23.0	227°36.4	-22°02.7
2	169°51.9	252°18.3	-21°11.8	144°55.3	10°48.9	271°28.9	-22°23.0	242°38.6	-22°02.7
3	184°54.4	267°17.6	-21°11.8	159°56.2	10°49.5	286°30.9	-22°23.0	257°40.7	-22°02.6
4	199°56.8	282°17.0	-21°11.8	174°57.1	10°50.2	301°32.9	-22°23.1	272°42.9	-22°02.6
5	214°59.3	297°16.4	-21°11.8	189°57.9	10°50.8	316°35.0	-22°23.1	287°45.1	-22°02.6
6	230°01.7	312°15.7	-21°11.8	204°58.8	10°51.4	331°37.0	-22°23.1	302°47.3	-22°02.6
7	245°04.2	327°15.1	-21°11.8	219°59.7	10°52.1	346°39.1	-22°23.2	317°49.5	-22°02.5
8	260°06.7	342°14.5	-21°11.8	235°00.5	10°52.7	1°41.1	-22°23.2	332°51.7	-22°02.5
9	275°09.1	357°13.8	-21°11.8	250°01.4	10°53.4	16°43.1	-22°23.2	347°53.9	-22°02.5
10	290°11.6	12°13.2	-21°11.8	265°02.3	10°54.0	31°45.2	-22°23.3	2°56.1	-22°02.4
11	305°14.1	27°12.6	-21°11.8	280°03.1	10°54.6	46°47.2	-22°23.3	17°58.2	-22°02.4
12	320°16.5	42°11.9	-21°11.8	295°04.0	10°55.3	61°49.3	-22°23.3	33°00.4	-22°02.4
13	335°19.0	57°11.3	-21°11.8	310°04.9	10°55.9	76°51.3	-22°23.4	48°02.6	-22°02.4
14	350°21.5	72°10.7	-21°11.8	325°05.7	10°56.6	91°53.4	-22°23.4	63°04.8	-22°02.3
15	5°23.9	87°10.0	-21°11.7	340°06.6	10°57.2	106°55.4	-22°23.4	78°07.0	-22°02.3
16	20°26.4	102°09.4	-21°11.7	355°07.5	10°57.8	121°57.4	-22°23.4	93°09.2	-22°02.3
17	35°28.9	117°08.8	-21°11.7	10°08.4	10°58.5	136°59.5	-22°23.5	108°11.4	-22°02.2
18	50°31.3	132°08.1	-21°11.7	25°09.2	10°59.1	152°01.5	-22°23.5	123°13.5	-22°02.2
19	65°33.8	147°07.5	-21°11.7	40°10.1	10°59.8	167°03.6	-22°23.5	138°15.7	-22°02.2
20	80°36.2	162°06.9	-21°11.7	55°11.0	11°00.4	182°05.6	-22°23.6	153°17.9	-22°02.2
21	95°38.7	177°06.2	-21°11.7	70°11.8	11°01.0	197°07.7	-22°23.6	168°20.1	-22°02.1
22	110°41.2	192°05.6	-21°11.6	85°12.7	11°01.7	212°09.7	-22°23.6	183°22.3	-22°02.1
23	125°43.6	207°05.0	-21°11.6	100°13.6	11°02.3	227°11.8	-22°23.7	198°24.5	-22°02.1
Mer.pass.:14:38		v-0.6 d-0.0 m-4.1		v0.9 d0.6 m1.0		v2.0 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	140°46.1	222°04.3	-21°11.6	115°14.4	11°03.0	242°13.8	-22°23.7	213°26.7	-22°02.0
1	155°48.6	237°03.7	-21°11.6	130°15.3	11°03.6	257°15.9	-22°23.7	228°28.9	-22°02.0
2	170°51.0	252°03.0	-21°11.6	145°16.2	11°04.2	272°17.9	-22°23.7	243°31.0	-22°02.0
3	185°53.5	267°02.4	-21°11.5	160°17.0	11°04.9	287°19.9	-22°23.8	258°33.2	-22°02.0
4	200°56.0	282°01.8	-21°11.5	175°17.9	11°05.5	302°22.0	-22°23.8	273°35.4	-22°01.9
5	215°58.4	297°01.1	-21°11.5	190°18.8	11°06.2	317°24.0	-22°23.8	288°37.6	-22°01.9
6	231°00.9	312°00.5	-21°11.5	205°19.6	11°06.8	332°26.1	-22°23.9	303°39.8	-22°01.9
7	246°03.4	326°59.9	-21°11.4	220°20.5	11°07.4	347°28.1	-22°23.9	318°42.0	-22°01.8
8	261°05.8	341°59.2	-21°11.4	235°21.4	11°08.1	2°30.2	-22°23.9	333°44.2	-22°01.8
9	276°08.3	356°58.6	-21°11.4	250°22.2	11°08.7	17°32.2	-22°24.0	348°46.4	-22°01.8
10	291°10.7	11°57.9	-21°11.4	265°23.1	11°09.3	32°34.3	-22°24.0	3°48.6	-22°01.8
11	306°13.2	26°57.3	-21°11.3	280°24.0	11°10.0	47°36.3	-22°24.0	18°50.7	-22°01.7
12	321°15.7	41°56.7	-21°11.3	295°24.8	11°10.6	62°38.4	-22°24.0	33°52.9	-22°01.7
13	336°18.1	56°56.0	-21°11.3	310°25.7	11°11.3	77°40.4	-22°24.1	48°55.1	-22°01.7
14	351°20.6	71°55.4	-21°11.2	325°26.6	11°11.9	92°42.5	-22°24.1	63°57.3	-22°01.6
15	6°23.1	86°54.7	-21°11.2	340°27.4	11°12.5	107°44.5	-22°24.1	78°59.5	-22°01.6
16	21°25.5	101°54.1	-21°11.2	355°28.3	11°13.2	122°46.6	-22°24.2	94°01.7	-22°01.6
17	36°28.0	116°53.5	-21°11.1	10°29.2	11°13.8	137°48.6	-22°24.2	109°03.9	-22°01.6
18	51°30.5	131°52.8	-21°11.1	25°30.0	11°14.4	152°50.7	-22°24.2	124°06.1	-22°01.5
19	66°32.9	146°52.2	-21°11.1	40°30.9	11°15.1	167°52.7	-22°24.3	139°08.3	-22°01.5
20	81°35.4	161°51.5	-21°11.0	55°31.8	11°15.7	182°54.8	-22°24.3	154°10.4	-22°01.5
21	96°37.8	176°50.9	-21°11.0	70°32.6	11°16.3	197°56.8	-22°24.3	169°12.6	-22°01.4
22	111°40.3	191°50.3	-21°10.9	85°33.5	11°17.0	212°58.9	-22°24.3	184°14.8	-22°01.4
23	126°42.8	206°49.6	-21°10.9	100°34.4	11°17.6	228°00.9	-22°24.4	199°17.0	-22°01.4
Mer.pass.:14:34		v-0.6 d0.0 m-4.0		v0.9 d0.6 m1.0		v2.0 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.2	-42°12.5
Schedar	349°36.5	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.1	-57°08.8
Hamal	327°56.5	23°33.1
Polaris	316°06.5	89°20.9
Akamar	315°15.4	-40°14.1
Menkar	314°11.0	4°09.6
Mirfak	308°34.8	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.5	46°01.0
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.3	-1°11.6
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.0	-52°42.7
Sirius	258°30.0	-16°44.6
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.4
Suhail	222°49.2	-43°30.7
Miaplacidus	221°38.0	-69°47.8
Alphard	217°52.0	-8°44.6
Regulus	207°39.1	11°52.3
Dubhe	193°46.4	61°38.8
Denebola	182°29.4	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°04.5	-63°12.0
Gacrux	171°56.2	-57°12.9
Alioth	166°17.0	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.7	49°12.9
Hadar	148°42.2	-60°27.5
Menkent	148°02.9	-36°27.6
Arcturus	145°52.0	19°05.2
Rigil Kent.	139°46.4	-60°54.4
Zubenelg.	137°01.1	-16°07.1
Kochab	137°20.0	74°04.4
Alphecca	126°07.8	26°39.0
Antares	112°21.6	-26°28.2
Atria	107°20.2	-69°03.3
Sabik	102°08.3	-15°44.8
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.1	12°32.8
Etamin	90°44.7	51°29.0
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.7	38°47.9
Nunki	75°53.8	-26°16.3
Altair	62°04.9	8°55.0
Peacock	53°13.8	-56°40.3
Deneb	49°29.3	45°20.8
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.2
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/2/9	SHA	Mer.pass
Venus	83°46.8	09:10
Mars	335°44.8	16:21
Jupiter	101°48.0	07:57
Saturn	72°53.9	09:52

2019/2/1	SHA	Mer.pass
Venus	82°32.6	09:11
Mars	335°06.6	16:19
Jupiter	101°37.8	07:53
Saturn	72°47.2	09:48

2019/2/1	SHA	Mer.pass
Venus	81°18.2	09:12
Mars	334°28.3	16:18
Jupiter	101°27.7	07:50
Saturn	72°40.6	09:45

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	*ν*	**Dec**	**d**	**HP**
0	176°27.3	-14°50.0	132°31.4	15.4	-2°35.3	11.0	54.5
1	191°27.3	-14°49.2	147°05.8	15.4	-2°24.3	11.0	54.6
2	206°27.3	-14°48.4	161°40.3	15.4	-2°13.3	11.0	54.6
3	221°27.3	-14°47.6	176°14.7	15.4	-2°02.3	11.0	54.6
4	236°27.2	-14°46.8	190°49.1	15.4	-1°51.2	11.0	54.6
5	251°27.2	-14°46.0	205°23.5	15.4	-1°40.2	11.1	54.6
6	266°27.2	-14°45.2	219°57.9	15.4	-1°29.1	11.1	54.6
7	281°27.2	-14°44.4	234°32.3	15.4	-1°18.0	11.1	54.7
8	296°27.2	-14°43.6	249°06.7	15.4	-1°06.9	11.1	54.7
9	311°27.1	-14°42.8	263°41.0	15.4	-0°55.8	11.1	54.7
10	326°27.1	-14°42.0	278°15.4	15.3	-0°44.7	11.1	54.7
11	341°27.1	-14°41.2	292°49.7	15.3	-0°33.6	11.1	54.7
12	356°27.1	-14°40.4	307°24.1	15.3	-0°22.5	11.1	54.7
13	11°27.1	-14°39.6	321°58.4	15.3	-0°11.4	11.1	54.8
14	26°27.0	-14°38.8	336°32.7	15.3	-0°00.2	11.1	54.8
15	41°27.0	-14°38.0	351°07.0	15.3	0°10.9	11.2	54.8
16	56°27.0	-14°37.2	5°41.2	15.3	0°22.1	11.2	54.8
17	71°27.0	-14°36.4	20°15.5	15.2	0°33.2	11.2	54.8
18	86°27.0	-14°35.6	34°49.7	15.2	0°44.4	11.2	54.9
19	101°27.0	-14°34.8	49°23.9	15.2	0°55.6	11.2	54.9
20	116°26.9	-14°34.0	63°58.1	15.2	1°06.7	11.2	54.9
21	131°26.9	-14°33.2	78°32.3	15.2	1°17.9	11.2	54.9
22	146°26.9	-14°32.4	93°06.4	15.1	1°29.1	11.2	54.9
23	161°26.9	-14°31.6	107°40.5	15.1	1°40.3	11.2	55.0
	SD.=16.2	d=0.8			S.D.=14.9		

Sun	**GHA**	**Dec**	**GHA**	*ν*	**Dec**	**d**	**HP**
0	176°26.9	-14°30.7	122°14.6	15.1	1°51.4	11.2	55.0
1	191°26.9	-14°29.9	136°48.7	15.1	2°02.6	11.2	55.0
2	206°26.9	-14°29.1	151°22.8	15.0	2°13.8	11.2	55.0
3	221°26.8	-14°28.3	165°56.8	15.0	2°25.0	11.2	55.0
4	236°26.8	-14°27.5	180°30.8	15.0	2°36.1	11.2	55.1
5	251°26.8	-14°26.7	195°04.7	15.0	2°47.3	11.2	55.1
6	266°26.8	-14°25.9	209°38.7	14.9	2°58.5	11.2	55.1
7	281°26.8	-14°25.1	224°12.6	14.9	3°09.6	11.2	55.1
8	296°26.8	-14°24.3	238°46.5	14.9	3°20.8	11.2	55.1
9	311°26.8	-14°23.5	253°20.3	14.8	3°31.9	11.1	55.2
10	326°26.8	-14°22.7	267°54.1	14.8	3°43.1	11.1	55.2
11	341°26.8	-14°21.8	282°27.9	14.8	3°54.2	11.1	55.2
12	356°26.7	-14°21.0	297°01.7	14.7	4°05.3	11.1	55.2
13	11°26.7	-14°20.2	311°35.4	14.7	4°16.5	11.1	55.3
14	26°26.7	-14°19.4	326°09.0	14.7	4°27.6	11.1	55.3
15	41°26.7	-14°18.6	340°42.7	14.6	4°38.7	11.1	55.3
16	56°26.7	-14°17.8	355°16.3	14.6	4°49.8	11.1	55.3
17	71°26.7	-14°17.0	9°49.8	14.5	5°00.8	11.1	55.3
18	86°26.7	-14°16.1	24°23.4	14.5	5°11.9	11.1	55.4
19	101°26.7	-14°15.3	38°56.9	14.5	5°23.0	11.0	55.4
20	116°26.7	-14°14.5	53°30.3	14.4	5°34.0	11.0	55.4
21	131°26.7	-14°13.7	68°03.7	14.4	5°45.0	11.0	55.4
22	146°26.7	-14°12.9	82°37.1	14.3	5°56.0	11.0	55.5
23	161°26.7	-14°12.1	97°10.4	14.3	6°07.0	11.0	55.5
	SD.=16.2	d=0.8			S.D.=15.0		

Mon	**GHA**	**Dec**	**GHA**	*ν*	**Dec**	**d**	**HP**
0	176°26.7	-14°11.2	111°43.6	14.2	6°18.0	11.0	55.5
1	191°26.6	-14°10.4	126°16.9	14.2	6°29.0	11.0	55.5
2	206°26.6	-14°09.6	140°50.0	14.2	6°39.9	10.9	55.6
3	221°26.6	-14°08.8	155°23.2	14.1	6°50.8	10.9	55.6
4	236°26.6	-14°08.0	169°56.2	14.1	7°01.7	10.9	55.6
5	251°26.6	-14°07.2	184°29.3	14.0	7°12.6	10.9	55.7
6	266°26.6	-14°06.3	199°02.2	14.0	7°23.5	10.8	55.7
7	281°26.6	-14°05.5	213°35.2	13.9	7°34.3	10.8	55.7
8	296°26.6	-14°04.7	228°08.0	13.8	7°45.1	10.8	55.7
9	311°26.6	-14°03.9	242°40.9	13.8	7°55.9	10.8	55.8
10	326°26.6	-14°03.1	257°13.6	13.7	8°06.7	10.8	55.8
11	341°26.6	-14°02.2	271°46.3	13.7	8°17.4	10.7	55.8
12	356°26.6	-14°01.4	286°19.0	13.6	8°28.2	10.7	55.8
13	11°26.6	-14°00.6	300°51.6	13.6	8°38.8	10.7	55.9
14	26°26.6	-13°59.8	315°24.1	13.5	8°49.5	10.6	55.9
15	41°26.6	-13°58.9	329°56.6	13.5	9°00.1	10.6	55.9
16	56°26.6	-13°58.1	344°29.1	13.4	9°10.7	10.6	56.0
17	71°26.6	-13°57.3	359°01.4	13.3	9°21.3	10.6	56.0
18	86°26.6	-13°56.5	13°33.7	13.3	9°31.8	10.5	56.0
19	101°26.6	-13°55.6	28°06.0	13.2	9°42.3	10.5	56.1
20	116°26.6	-13°54.8	42°38.2	13.1	9°52.8	10.5	56.1
21	131°26.6	-13°54.0	57°10.3	13.1	10°03.3	10.4	56.1
22	146°26.6	-13°53.2	71°42.3	13.0	10°13.7	10.4	56.1
23	161°26.6	-13°52.3	86°14.3	13.0	10°24.0	10.3	56.2
	SD.=16.2	d=0.8			S.D.=15.1		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:36	07:59	09:25	15:05	16:31	17:54
70	06:32	07:46	08:60	15:30	16:44	17:58
68	06:29	07:36	08:40	15:49	16:54	18:01
66	06:26	07:27	08:25	16:05	17:03	18:04
64	06:23	07:19	08:12	16:17	17:10	18:07
62	06:20	07:13	08:01	16:28	17:17	18:09
60	06:18	07:07	07:52	16:37	17:22	18:12
58	06:16	07:02	07:44	16:45	17:27	18:14
56	06:14	06:58	07:37	16:52	17:32	18:16
54	06:12	06:53	07:31	16:58	17:36	18:18
52	06:10	06:50	07:25	17:04	17:40	18:19
50	06:08	06:46	07:20	17:09	17:43	18:21
45	06:04	06:38	07:09	17:20	17:51	18:25
40	05:59	06:31	06:59	17:29	17:58	18:30
35	05:55	06:25	06:51	17:37	18:04	18:33
30	05:51	06:20	06:44	17:44	18:09	18:37
20	05:43	06:09	06:32	17:57	18:19	18:45
10	05:34	05:59	06:21	18:07	18:29	18:54
0	05:25	05:49	06:11	18:18	18:39	19:04
-10	05:13	05:39	06:00	18:28	18:50	19:15
-20	04:59	05:26	05:49	18:39	19:02	19:29
-30	04:41	05:11	05:36	18:52	19:17	19:47
-35	04:29	05:01	05:28	18:59	19:26	19:59
-40	04:15	04:51	05:20	19:08	19:37	20:12
-45	03:58	04:37	05:09	19:18	19:50	20:30
-50	03:35	04:21	04:57	19:30	20:06	20:52
-52	03:23	04:13	04:51	19:36	20:14	21:03
-54	03:10	04:04	04:45	19:42	20:23	21:16
-56	02:54	03:54	04:38	19:49	20:33	21:32
-58	02:35	03:42	04:30	19:57	20:44	21:51
-60	02:09	03:28	04:20	20:06	20:58	22:15

		Moonrise			**Moonset**	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	09:38	09:24	09:09	22:05	23:50	–:–
70	09:36	09:29	09:20	22:03	23:41	–:–
68	09:35	09:33	09:30	22:01	23:34	–:–
66	09:35	09:36	09:37	21:60	23:28	–:–
64	09:34	09:39	09:44	21:59	23:22	–:–
62	09:33	09:41	09:50	21:58	23:18	–:–
60	09:33	09:43	09:55	21:57	23:14	–:–
58	09:32	09:45	09:59	21:56	23:11	–:–
56	09:32	09:47	10:03	21:55	23:07	–:–
54	09:31	09:48	10:07	21:55	23:05	–:–
52	09:31	09:50	10:10	21:54	23:02	–:–
50	09:31	09:51	10:13	21:54	23:00	–:–
45	09:30	09:54	10:19	21:53	22:55	23:59
40	09:29	09:56	10:25	21:52	22:51	23:52
35	09:29	09:58	10:29	21:51	22:48	23:46
30	09:28	10:00	10:33	21:50	22:44	23:40
20	09:28	10:03	10:41	21:49	22:39	23:31
10	09:27	10:06	10:47	21:48	22:34	23:23
0	09:26	10:09	10:53	21:47	22:30	23:15
-10	09:26	10:12	10:59	21:46	22:26	23:07
-20	09:25	10:15	11:06	21:45	22:21	22:59
-30	09:24	10:18	11:13	21:43	22:16	22:50
-35	09:24	10:20	11:18	21:43	22:13	22:45
-40	09:24	10:22	11:22	21:42	22:09	22:39
-45	09:23	10:25	11:28	21:41	22:05	22:32
-50	09:22	10:28	11:35	21:40	22:00	22:23
-52	09:22	10:29	11:38	21:39	21:58	22:19
-54	09:22	10:31	11:42	21:38	21:56	22:15
-56	09:21	10:33	11:46	21:38	21:53	22:10
-58	09:21	10:35	11:50	21:37	21:50	22:05
-60	09:21	10:37	11:55	21:36	21:47	21:59

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	14:11	14:12	12:14	15:36	03:15	5(18%)
10	14:12	14:13	12:14	16:19	03:57	6(26%)
11	14:13	14:14	12:14	17:04	04:41	7(36%)

February 12, 13 ,14 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	141°45.2	221°49.0	-21°10.9	115°35.2	11°18.3	243°03.0	-22°24.4	214°19.2	-22°01.4
1	156°47.7	236°48.3	-21°10.8	130°36.1	11°18.9	258°05.0	-22°24.4	229°21.4	-22°01.3
2	171°50.2	251°47.7	-21°10.8	145°37.0	11°19.5	273°07.1	-22°24.5	244°23.6	-22°01.3
3	186°52.6	266°47.1	-21°10.7	160°37.8	11°20.2	288°09.1	-22°24.5	259°25.8	-22°01.3
4	201°55.1	281°46.4	-21°10.7	175°38.7	11°20.8	303°11.2	-22°24.5	274°28.0	-22°01.2
5	216°57.6	296°45.8	-21°10.6	190°39.6	11°21.4	318°13.2	-22°24.6	289°30.2	-22°01.2
6	232°00.0	311°45.1	-21°10.6	205°40.4	11°22.1	333°15.3	-22°24.6	304°32.3	-22°01.2
7	247°02.5	326°44.5	-21°10.5	220°41.3	11°22.7	348°17.3	-22°24.6	319°34.5	-22°01.2
8	262°05.0	341°43.8	-21°10.5	235°42.2	11°23.3	3°19.4	-22°24.6	334°36.7	-22°01.1
9	277°07.4	356°43.2	-21°10.4	250°43.0	11°24.0	18°21.4	-22°24.7	349°38.9	-22°01.1
10	292°09.9	11°42.6	-21°10.4	265°43.9	11°24.6	33°23.5	-22°24.7	4°41.1	-22°01.1
11	307°12.3	26°41.9	-21°10.3	280°44.8	11°25.2	48°25.5	-22°24.7	19°43.3	-22°01.0
12	322°14.8	41°41.3	-21°10.3	295°45.6	11°25.9	63°27.6	-22°24.8	34°45.5	-22°01.0
13	337°17.3	56°40.6	-21°10.2	310°46.5	11°26.5	78°29.6	-22°24.8	49°47.7	-22°01.0
14	352°19.7	71°40.0	-21°10.2	325°47.3	11°27.1	93°31.7	-22°24.8	64°49.9	-22°01.0
15	7°22.2	86°39.3	-21°10.1	340°48.2	11°27.8	108°33.8	-22°24.8	79°52.1	-22°00.9
16	22°24.7	101°38.7	-21°10.0	355°49.1	11°28.4	123°35.8	-22°24.9	94°54.3	-22°00.9
17	37°27.1	116°38.1	-21°10.0	10°49.9	11°29.0	138°37.9	-22°24.9	109°56.4	-22°00.9
18	52°29.6	131°37.4	-21°09.9	25°50.8	11°29.7	153°39.9	-22°24.9	124°58.6	-22°00.8
19	67°32.1	146°36.8	-21°09.9	40°51.7	11°30.3	168°42.0	-22°25.0	140°00.8	-22°00.8
20	82°34.5	161°36.1	-21°09.8	55°52.5	11°30.9	183°44.0	-22°25.0	155°03.0	-22°00.8
21	97°37.0	176°35.5	-21°09.7	70°53.4	11°31.6	198°46.1	-22°25.0	170°05.2	-22°00.8
22	112°39.4	191°34.8	-21°09.7	85°54.3	11°32.2	213°48.1	-22°25.0	185°07.4	-22°00.7
23	127°41.9	206°34.2	-21°09.6	100°55.1	11°32.8	228°50.2	-22°25.1	200°09.6	-22°00.7
Mer.pass.:14:30		v-0.6 d0.0 m-4.0		v0.9 d0.6 m1.0		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	142°44.4	221°33.5	-21°09.5	115°56.0	11°33.4	243°52.2	-22°25.1	215°11.8	-22°00.7
1	157°46.8	236°32.9	-21°09.5	130°56.8	11°34.1	258°54.3	-22°25.1	230°14.0	-22°00.6
2	172°49.3	251°32.3	-21°09.4	145°57.7	11°34.7	273°56.4	-22°25.2	245°16.2	-22°00.6
3	187°51.8	266°31.6	-21°09.3	160°58.6	11°35.3	288°58.4	-22°25.2	260°18.4	-22°00.6
4	202°54.2	281°31.0	-21°09.3	175°59.4	11°36.0	304°00.5	-22°25.2	275°20.6	-22°00.6
5	217°56.7	296°30.3	-21°09.2	191°00.3	11°36.6	319°02.5	-22°25.2	290°22.7	-22°00.5
6	232°59.2	311°29.7	-21°09.1	206°01.2	11°37.2	334°04.6	-22°25.3	305°24.9	-22°00.5
7	248°01.6	326°29.0	-21°09.0	221°02.0	11°37.9	349°06.6	-22°25.3	320°27.1	-22°00.5
8	263°04.1	341°28.4	-21°09.0	236°02.9	11°38.5	4°08.7	-22°25.3	335°29.3	-22°00.4
9	278°06.6	356°27.7	-21°08.9	251°03.7	11°39.1	19°10.8	-22°25.4	350°31.5	-22°00.4
10	293°09.0	11°27.1	-21°08.8	266°04.6	11°39.7	34°12.8	-22°25.4	5°33.7	-22°00.4
11	308°11.5	26°26.4	-21°08.7	281°05.5	11°40.4	49°14.9	-22°25.4	20°35.9	-22°00.4
12	323°13.9	41°25.8	-21°08.7	296°06.3	11°41.0	64°16.9	-22°25.4	35°38.1	-22°00.3
13	338°16.4	56°25.1	-21°08.6	311°07.2	11°41.6	79°19.0	-22°25.5	50°40.3	-22°00.3
14	353°18.9	71°24.5	-21°08.5	326°08.1	11°42.3	94°21.1	-22°25.5	65°42.5	-22°00.3
15	8°21.3	86°23.9	-21°08.4	341°08.9	11°42.9	109°23.1	-22°25.5	80°44.7	-22°00.2
16	23°23.8	101°23.2	-21°08.3	356°09.8	11°43.5	124°25.2	-22°25.6	95°46.9	-22°00.2
17	38°26.3	116°22.6	-21°08.3	11°10.6	11°44.2	139°27.2	-22°25.6	110°49.1	-22°00.2
18	53°28.7	131°21.9	-21°08.2	26°11.5	11°44.8	154°29.3	-22°25.6	125°51.3	-22°00.2
19	68°31.2	146°21.3	-21°08.1	41°12.4	11°45.4	169°31.3	-22°25.6	140°53.4	-22°00.1
20	83°33.7	161°20.6	-21°08.0	56°13.2	11°46.0	184°33.4	-22°25.7	155°55.6	-22°00.1
21	98°36.1	176°20.0	-21°07.9	71°14.1	11°46.7	199°35.5	-22°25.7	170°57.8	-22°00.1
22	113°38.6	191°19.3	-21°07.8	86°14.9	11°47.3	214°37.5	-22°25.7	186°00.0	-22°00.0
23	128°41.1	206°18.7	-21°07.7	101°15.8	11°47.9	229°39.6	-22°25.8	201°02.2	-22°00.0
Mer.pass.:14:26		v-0.6 d0.1 m-4.0		v0.9 d0.6 m1.0		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	143°43.5	221°18.0	-21°07.6	116°16.7	11°48.5	244°41.7	-22°25.8	216°04.4	-21°60.0
1	158°46.0	236°17.4	-21°07.6	131°17.5	11°49.2	259°43.7	-22°25.8	231°06.6	-21°60.0
2	173°48.4	251°16.7	-21°07.5	146°18.4	11°49.8	274°45.8	-22°25.8	246°08.8	-21°59.9
3	188°50.9	266°16.1	-21°07.4	161°19.2	11°50.4	289°47.8	-22°25.9	261°11.0	-21°59.9
4	203°53.4	281°15.4	-21°07.3	176°20.1	11°51.1	304°49.9	-22°25.9	276°13.2	-21°59.9
5	218°55.8	296°14.8	-21°07.2	191°21.0	11°51.7	319°52.0	-22°25.9	291°15.4	-21°59.8
6	233°58.3	311°14.1	-21°07.1	206°21.8	11°52.3	334°54.0	-22°26.0	306°17.6	-21°59.8
7	249°00.8	326°13.5	-21°07.0	221°22.7	11°52.9	349°56.1	-22°26.0	321°19.8	-21°59.8
8	264°03.2	341°12.8	-21°06.9	236°23.5	11°53.6	4°58.2	-22°26.0	336°22.0	-21°59.8
9	279°05.7	356°12.2	-21°06.8	251°24.4	11°54.2	20°00.2	-22°26.0	351°24.2	-21°59.7
10	294°08.2	11°11.5	-21°06.7	266°25.3	11°54.8	35°02.3	-22°26.1	6°26.4	-21°59.7
11	309°10.6	26°10.9	-21°06.6	281°26.1	11°55.4	50°04.3	-22°26.1	21°28.6	-21°59.7
12	324°13.1	41°10.2	-21°06.5	296°27.0	11°56.1	65°06.4	-22°26.1	36°30.8	-21°59.6
13	339°15.6	56°09.6	-21°06.4	311°27.8	11°56.7	80°08.5	-22°26.1	51°33.0	-21°59.6
14	354°18.0	71°08.9	-21°06.3	326°28.7	11°57.3	95°10.5	-22°26.2	66°35.1	-21°59.6
15	9°20.5	86°08.3	-21°06.2	341°29.6	11°57.9	110°12.6	-22°26.2	81°37.3	-21°59.6
16	24°22.9	101°07.6	-21°06.1	356°30.4	11°58.6	125°14.7	-22°26.2	96°39.5	-21°59.5
17	39°25.4	116°07.0	-21°06.0	11°31.3	11°59.2	140°16.7	-22°26.3	111°41.7	-21°59.5
18	54°27.9	131°06.3	-21°05.9	26°32.1	11°59.8	155°18.8	-22°26.3	126°43.9	-21°59.5
19	69°30.3	146°05.7	-21°05.7	41°33.0	12°00.4	170°20.9	-22°26.3	141°46.1	-21°59.4
20	84°32.8	161°05.0	-21°05.6	56°33.9	12°01.1	185°22.9	-22°26.3	156°48.3	-21°59.4
21	99°35.3	176°04.4	-21°05.5	71°34.7	12°01.7	200°25.0	-22°26.4	171°50.5	-21°59.4
22	114°37.7	191°03.7	-21°05.4	86°35.6	12°02.3	215°27.1	-22°26.4	186°52.7	-21°59.4
23	129°40.2	206°03.1	-21°05.3	101°36.4	12°02.9	230°29.1	-22°26.4	201°54.9	-21°59.3
Mer.pass.:14:22		v-0.6 d0.1 m-4.0		v0.9 d0.6 m1.0		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.2	-42°12.5
Schedar	349°36.5	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.2	-57°08.8
Hamal	327°56.5	23°33.0
Polaris	316°07.9	89°20.9
Akamar	315°15.4	-40°14.1
Menkar	314°11.0	4°09.6
Mirfak	308°34.8	49°55.7
Aldebaran	290°44.8	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.5	46°01.0
Bellatrix	278°27.7	6°21.8
Elnath	278°07.5	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.1	-52°42.7
Sirius	258°30.0	-16°44.6
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.8	-59°34.4
Suhail	222°49.2	-43°30.7
Miaplacidus	221°38.0	-69°47.8
Alphard	217°52.0	-8°44.6
Regulus	207°39.1	11°52.3
Dubhe	193°46.4	61°38.8
Denebola	182°29.4	14°27.9
Gienah	175°48.0	-17°38.8
Acrux	173°04.5	-63°12.0
Gacrux	171°56.2	-57°13.0
Alioth	166°17.0	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.6	49°12.9
Hadar	148°42.2	-60°27.5
Menkent	148°02.9	-36°27.6
Arcturus	145°52.0	19°05.2
Rigil Kent.	139°46.3	-60°54.4
Zubenelg.	137°01.1	-16°07.1
Kochab	137°19.9	74°04.4
Alphecca	126°07.8	26°39.0
Antares	112°21.6	-26°28.2
Atria	107°20.2	-69°03.3
Sabik	102°08.3	-15°44.8
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.1	12°32.8
Etamin	90°44.7	51°29.0
Kaus Aust.	83°39.0	-34°22.3
Vega	80°36.7	38°47.9
Nunki	75°53.8	-26°16.3
Altair	62°04.8	8°55.0
Peacock	53°13.7	-56°40.3
Deneb	49°29.3	45°20.8
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.2
Fomalhaut	15°20.1	-29°31.5
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/2/1	**SHA**	**Mer.pass**
Venus	80°03.7	09:13
Mars	333°50.0	16:17
Jupiter	101°17.7	07:47
Saturn	72°34.0	09:41

2019/2/1	**SHA**	**Mer.pass**
Venus	78°49.2	09:14
Mars	333°11.6	16:15
Jupiter	101°07.9	07:43
Saturn	72°27.4	09:38

2019/2/1	**SHA**	**Mer.pass**
Venus	77°34.5	09:15
Mars	332°33.1	16:14
Jupiter	100°58.1	07:40
Saturn	72°20.9	09:34

Horizontal paralax	
Venus:	0.2
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°26.6	-13°51.5	100°46.2	12.9	10°34.4	10.3	56.2
1	191°26.6	-13°50.7	115°18.1	12.8	10°44.6	10.3	56.2
2	206°26.6	-13°49.9	129°49.9	12.8	10°54.9	10.2	56.3
3	221°26.6	-13°49.0	144°21.6	12.7	11°05.1	10.2	56.3
4	236°26.6	-13°48.2	158°53.2	12.6	11°15.3	10.2	56.3
5	251°26.6	-13°47.4	173°24.8	12.5	11°25.4	10.1	56.4
6	266°26.6	-13°46.5	187°56.3	12.5	11°35.5	10.1	56.4
7	281°26.6	-13°45.7	202°27.8	12.4	11°45.6	10.0	56.4
8	296°26.6	-13°44.9	216°59.1	12.3	11°55.5	10.0	56.5
9	311°26.6	-13°44.1	231°30.4	12.3	12°05.5	9.9	56.5
10	326°26.7	-13°43.2	246°01.6	12.2	12°15.4	9.9	56.5
11	341°26.7	-13°42.4	260°32.8	12.1	12°25.3	9.8	56.6
12	356°26.7	-13°41.6	275°03.8	12.0	12°35.1	9.8	56.6
13	11°26.7	-13°40.7	289°34.8	11.9	12°44.8	9.7	56.6
14	26°26.7	-13°39.9	304°05.7	11.9	12°54.6	9.7	56.7
15	41°26.7	-13°39.1	318°36.5	11.8	13°04.2	9.6	56.7
16	56°26.7	-13°38.2	333°07.3	11.7	13°13.8	9.6	56.7
17	71°26.7	-13°37.4	347°38.0	11.6	13°23.4	9.5	56.8
18	86°26.7	-13°36.6	2°08.6	11.6	13°32.9	9.5	56.8
19	101°26.7	-13°35.7	16°39.1	11.5	13°42.3	9.4	56.8
20	116°26.7	-13°34.9	31°09.5	11.4	13°51.7	9.4	56.9
21	131°26.7	-13°34.1	45°39.8	11.3	14°01.0	9.3	56.9
22	146°26.7	-13°33.2	60°10.1	11.2	14°10.3	9.2	56.9
23	161°26.8	-13°32.4	74°40.3	11.1	14°19.5	9.2	57.0
	SD.=16.2	d=0.8			S.D.=15.3		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°26.8	-13°31.5	89°10.4	11.1	14°28.6	9.1	57.0
1	191°26.8	-13°30.7	103°40.4	11.0	14°37.7	9.1	57.0
2	206°26.8	-13°29.9	118°10.3	10.9	14°46.7	9.0	57.1
3	221°26.8	-13°29.0	132°40.2	10.8	14°55.7	8.9	57.1
4	236°26.8	-13°28.2	147°09.9	10.7	15°04.6	8.9	57.2
5	251°26.8	-13°27.4	161°39.6	10.6	15°13.4	8.8	57.2
6	266°26.8	-13°26.5	176°09.1	10.5	15°22.1	8.7	57.2
7	281°26.8	-13°25.7	190°38.6	10.4	15°30.8	8.6	57.3
8	296°26.9	-13°24.8	205°08.0	10.4	15°39.4	8.6	57.3
9	311°26.9	-13°24.0	219°37.3	10.3	15°48.0	8.5	57.3
10	326°26.9	-13°23.2	234°06.6	10.2	15°56.5	8.4	57.4
11	341°26.9	-13°22.3	248°35.7	10.1	16°04.8	8.4	57.4
12	356°26.9	-13°21.5	263°04.7	10.0	16°13.2	8.3	57.4
13	11°26.9	-13°20.6	277°33.7	9.9	16°21.4	8.2	57.5
14	26°26.9	-13°19.8	292°02.5	9.8	16°29.6	8.1	57.5
15	41°27.0	-13°19.0	306°31.3	9.7	16°37.7	8.0	57.6
16	56°27.0	-13°18.1	320°60.0	9.6	16°45.7	8.0	57.6
17	71°27.0	-13°17.3	335°28.6	9.5	16°53.6	7.9	57.6
18	86°27.0	-13°16.4	349°57.1	9.4	17°01.4	7.8	57.7
19	101°27.0	-13°15.6	4°25.4	9.3	17°09.2	7.7	57.7
20	116°27.0	-13°14.7	18°53.8	9.3	17°16.9	7.6	57.7
21	131°27.1	-13°13.9	33°22.0	9.2	17°24.4	7.5	57.8
22	146°27.1	-13°13.1	47°50.1	9.1	17°31.9	7.5	57.8
23	161°27.1	-13°12.2	62°18.1	9.0	17°39.3	7.4	57.9
	SD.=16.2	d=0.8			S.D.=15.6		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.1	-13°11.4	76°46.0	8.9	17°46.7	7.3	57.9
1	191°27.1	-13°10.5	91°13.9	8.8	17°53.9	7.2	57.9
2	206°27.2	-13°09.7	105°41.6	8.7	18°01.0	7.1	58.0
3	221°27.2	-13°08.8	120°09.2	8.6	18°08.1	7.0	58.0
4	236°27.2	-13°08.0	134°36.8	8.5	18°15.0	6.9	58.1
5	251°27.2	-13°07.1	149°04.2	8.4	18°21.9	6.8	58.1
6	266°27.2	-13°06.3	163°31.6	8.3	18°28.6	6.7	58.1
7	281°27.3	-13°05.4	177°58.9	8.2	18°35.3	6.6	58.2
8	296°27.3	-13°04.6	192°26.0	8.1	18°41.8	6.5	58.2
9	311°27.3	-13°03.7	206°53.1	8.0	18°48.3	6.4	58.3
10	326°27.3	-13°02.9	221°20.1	7.9	18°54.6	6.3	58.3
11	341°27.3	-13°02.0	235°47.0	7.8	19°00.9	6.2	58.3
12	356°27.4	-13°01.2	250°13.8	7.7	19°07.0	6.1	58.4
13	11°27.4	-13°00.3	264°40.5	7.7	19°13.1	6.0	58.4
14	26°27.4	-12°59.5	279°07.1	7.6	19°19.0	5.9	58.4
15	41°27.4	-12°58.6	293°33.6	7.5	19°24.8	5.8	58.5
16	56°27.5	-12°57.8	308°00.0	7.4	19°30.5	5.7	58.5
17	71°27.5	-12°56.9	322°26.3	7.3	19°36.1	5.5	58.6
18	86°27.5	-12°56.1	336°52.6	7.2	19°41.6	5.4	58.6
19	101°27.5	-12°55.2	351°18.7	7.1	19°47.0	5.3	58.6
20	116°27.5	-12°54.4	5°44.8	7.0	19°52.2	5.2	58.7
21	131°27.6	-12°53.5	20°10.7	6.9	19°57.4	5.1	58.7
22	146°27.6	-12°52.7	34°36.6	6.8	20°02.4	5.0	58.8
23	161°27.6	-12°51.8	49°02.4	6.7	20°07.3	4.8	58.8
	SD.=16.2	d=0.8			S.D.=15.8		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:24	07:45	09:07	15:23	16:45	18:06
70	06:21	07:34	08:45	15:45	16:56	18:09
68	06:19	07:25	08:28	16:02	17:05	18:11
66	06:17	07:17	08:14	16:16	17:12	18:13
64	06:15	07:11	08:02	16:27	17:19	18:15
62	06:13	07:05	07:53	16:37	17:24	18:17
60	06:11	07:00	07:44	16:45	17:29	18:18
58	06:09	06:56	07:37	16:52	17:34	18:20
56	06:08	06:51	07:31	16:59	17:38	18:22
54	06:06	06:48	07:25	17:04	17:42	18:23
52	06:05	06:44	07:20	17:10	17:45	18:25
50	06:03	06:41	07:15	17:14	17:48	18:26
45	05:60	06:34	07:04	17:25	17:55	18:29
40	05:56	06:28	06:56	17:33	18:01	18:33
35	05:53	06:22	06:48	17:40	18:06	18:36
30	05:49	06:17	06:42	17:47	18:11	18:40
20	05:42	06:08	06:30	17:58	18:21	18:47
10	05:34	05:59	06:20	18:08	18:30	18:55
0	05:25	05:50	06:11	18:18	18:39	19:04
-10	05:14	05:39	06:01	18:27	18:49	19:14
-20	05:01	05:28	05:51	18:38	19:00	19:27
-30	04:44	05:13	05:38	18:49	19:14	19:44
-35	04:33	05:05	05:31	18:56	19:23	19:55
-40	04:19	04:54	05:23	19:04	19:33	20:08
-45	04:03	04:42	05:14	19:14	19:45	20:24
-50	03:42	04:27	05:02	19:25	20:01	20:45
-52	03:31	04:19	04:57	19:30	20:08	20:56
-54	03:19	04:11	04:51	19:36	20:16	21:08
-56	03:04	04:02	04:44	19:43	20:25	21:22
-58	02:47	03:51	04:37	19:50	20:36	21:39
-60	02:24	03:38	04:29	19:58	20:48	22:00

		Moonrise			**Moonset**	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	08:51	08:24	–:–	01:43	03:52	–:–
70	09:11	08:60	08:40	01:25	03:17	05:25
68	09:27	09:26	09:26	01:10	02:52	04:41
66	09:40	09:46	09:56	00:58	02:33	04:11
64	09:51	10:02	10:18	00:49	02:18	03:49
62	10:01	10:15	10:36	00:40	02:05	03:32
60	10:09	10:27	10:52	00:33	01:55	03:17
58	10:16	10:36	11:04	00:27	01:45	03:05
56	10:22	10:45	11:16	00:21	01:37	02:54
54	10:28	10:53	11:25	00:16	01:30	02:45
52	10:33	10:60	11:34	00:12	01:24	02:36
50	10:37	11:06	11:42	00:08	01:18	02:29
45	10:47	11:20	11:59	–:–	01:05	02:13
40	10:56	11:31	12:13	–:–	00:55	01:60
35	11:03	11:41	12:24	–:–	00:46	01:49
30	11:09	11:49	12:35	–:–	00:39	01:39
20	11:21	12:04	12:53	–:–	00:25	01:22
10	11:30	12:17	13:08	–:–	00:14	01:08
0	11:40	12:29	13:23	–:–	00:03	00:54
-10	11:49	12:41	13:37	23:52	–:–	00:41
-20	11:59	12:55	13:53	23:41	–:–	00:26
-30	12:10	13:10	14:11	23:28	–:–	00:10
-35	12:17	13:19	14:22	23:20	–:–	00:00
-40	12:25	13:29	14:34	23:11	23:49	–:–
-45	12:34	13:41	14:49	23:01	23:37	–:–
-50	12:44	13:55	15:06	22:49	23:21	–:–
-52	12:49	14:02	15:15	22:44	23:14	23:52
-54	12:55	14:09	15:24	22:38	23:06	23:43
-56	13:01	14:18	15:35	22:31	22:57	23:32
-58	13:08	14:28	15:47	22:23	22:47	23:19
-60	13:16	14:39	16:01	22:15	22:35	23:05

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	14:14	14:13	12:14	17:51	05:27	8(46%)
13	14:13	14:12	12:14	18:41	06:15	9(56%)
14	14:12	14:11	12:14	19:36	07:08	10(67%)

February 15, 16 ,17 (Fri., Sat., Sun.)

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	144°42.7	221°02.4	-21°05.2	116°37.3	12°03.5	245°31.2	-22°26.4	216°57.1	-21°59.3
1	159°45.1	236°01.8	-21°05.1	131°38.1	12°04.2	260°33.3	-22°26.5	231°59.3	-21°59.3
2	174°47.6	251°01.1	-21°05.0	146°39.0	12°04.8	275°35.3	-22°26.5	247°01.5	-21°59.2
3	189°50.0	266°00.5	-21°04.8	161°39.9	12°05.4	290°37.4	-22°26.5	262°03.7	-21°59.2
4	204°52.5	280°59.8	-21°04.7	176°40.7	12°06.0	305°39.5	-22°26.6	277°05.9	-21°59.2
5	219°55.0	295°59.2	-21°04.6	191°41.6	12°06.7	320°41.5	-22°26.6	292°08.1	-21°59.2
6	234°57.4	310°58.5	-21°04.5	206°42.4	12°07.3	335°43.6	-22°26.6	307°10.3	-21°59.1
7	249°59.9	325°57.8	-21°04.4	221°43.3	12°07.9	350°45.7	-22°26.6	322°12.5	-21°59.1
8	265°02.4	340°57.2	-21°04.2	236°44.1	12°08.5	5°47.7	-22°26.7	337°14.7	-21°59.1
9	280°04.8	355°56.5	-21°04.1	251°45.0	12°09.1	20°49.8	-22°26.7	352°16.9	-21°59.0
10	295°07.3	10°55.9	-21°04.0	266°45.9	12°09.8	35°51.9	-22°26.7	7°19.1	-21°59.0
11	310°09.8	25°55.2	-21°03.9	281°46.7	12°10.4	50°53.9	-22°26.7	22°21.3	-21°59.0
12	325°12.2	40°54.6	-21°03.7	296°47.6	12°11.0	65°56.0	-22°26.8	37°23.5	-21°59.0
13	340°14.7	55°53.9	-21°03.6	311°48.4	12°11.6	80°58.1	-22°26.8	52°25.7	-21°58.9
14	355°17.2	70°53.3	-21°03.5	326°49.3	12°12.3	96°00.1	-22°26.8	67°27.9	-21°58.9
15	10°19.6	85°52.6	-21°03.3	341°50.1	12°12.9	111°02.2	-22°26.9	82°30.1	-21°58.9
16	25°22.1	100°52.0	-21°03.2	356°51.0	12°13.5	126°04.3	-22°26.9	97°32.3	-21°58.9
17	40°24.5	115°51.3	-21°03.1	11°51.9	12°14.1	141°06.4	-22°26.9	112°34.5	-21°58.8
18	55°27.0	130°50.7	-21°03.0	26°52.7	12°14.7	156°08.4	-22°26.9	127°36.7	-21°58.8
19	70°29.5	145°50.0	-21°02.8	41°53.6	12°15.4	171°10.5	-22°27.0	142°38.9	-21°58.8
20	85°31.9	160°49.4	-21°02.7	56°54.4	12°16.0	186°12.6	-22°27.0	157°41.1	-21°58.7
21	100°34.4	175°48.7	-21°02.6	71°55.3	12°16.6	201°14.6	-22°27.0	172°43.3	-21°58.7
22	115°36.9	190°48.0	-21°02.4	86°56.1	12°17.2	216°16.7	-22°27.0	187°45.5	-21°58.7
23	130°39.3	205°47.4	-21°02.3	101°57.0	12°17.8	231°18.8	-22°27.1	202°47.6	-21°58.7
Mer.pass.:14:18		v-0.7 d0.1 m-4.0		v0.9 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	145°41.8	220°46.7	-21°02.1	116°57.8	12°18.5	246°20.8	-22°27.1	217°49.8	-21°58.6
1	160°44.3	235°46.1	-21°02.0	131°58.7	12°19.1	261°22.9	-22°27.1	232°52.0	-21°58.6
2	175°46.7	250°45.4	-21°01.9	146°59.6	12°19.7	276°25.0	-22°27.1	247°54.2	-21°58.6
3	190°49.2	265°44.8	-21°01.7	162°00.4	12°20.3	291°27.1	-22°27.2	262°56.4	-21°58.5
4	205°51.7	280°44.1	-21°01.6	177°01.3	12°20.9	306°29.1	-22°27.2	277°58.6	-21°58.5
5	220°54.1	295°43.5	-21°01.4	192°02.1	12°21.5	321°31.2	-22°27.2	293°00.8	-21°58.5
6	235°56.6	310°42.8	-21°01.3	207°03.0	12°22.2	336°33.3	-22°27.2	308°03.0	-21°58.5
7	250°59.0	325°42.2	-21°01.1	222°03.8	12°22.8	351°35.4	-22°27.3	323°05.2	-21°58.4
8	266°01.5	340°41.5	-21°01.0	237°04.7	12°23.4	6°37.4	-22°27.3	338°07.4	-21°58.4
9	281°04.0	355°40.8	-21°00.9	252°05.5	12°24.0	21°39.5	-22°27.3	353°09.6	-21°58.4
10	296°06.4	10°40.2	-21°00.7	267°06.4	12°24.6	36°41.6	-22°27.4	8°11.8	-21°58.3
11	311°08.9	25°39.5	-21°00.6	282°07.3	12°25.3	51°43.7	-22°27.4	23°14.0	-21°58.3
12	326°11.4	40°38.9	-21°00.4	297°08.1	12°25.9	66°45.7	-22°27.4	38°16.2	-21°58.3
13	341°13.8	55°38.2	-21°00.3	312°09.0	12°26.5	81°47.8	-22°27.4	53°18.4	-21°58.3
14	356°16.3	70°37.6	-21°00.1	327°09.8	12°27.1	96°49.9	-22°27.5	68°20.6	-21°58.2
15	11°18.8	85°36.9	-20°59.9	342°10.7	12°27.7	111°52.0	-22°27.5	83°22.8	-21°58.2
16	26°21.2	100°36.3	-20°59.8	357°11.5	12°28.3	126°54.0	-22°27.5	98°25.0	-21°58.2
17	41°23.7	115°35.6	-20°59.6	12°12.4	12°28.9	141°56.1	-22°27.5	113°27.2	-21°58.1
18	56°26.2	130°34.9	-20°59.5	27°13.2	12°29.6	156°58.2	-22°27.6	128°29.4	-21°58.1
19	71°28.6	145°34.3	-20°59.3	42°14.1	12°30.2	172°00.3	-22°27.6	143°31.6	-21°58.1
20	86°31.1	160°33.6	-20°59.2	57°14.9	12°30.8	187°02.3	-22°27.6	158°33.8	-21°58.1
21	101°33.5	175°33.0	-20°59.0	72°15.8	12°31.4	202°04.4	-22°27.6	173°36.0	-21°58.0
22	116°36.0	190°32.3	-20°58.8	87°16.6	12°32.0	217°06.5	-22°27.7	188°38.2	-21°58.0
23	131°38.5	205°31.7	-20°58.7	102°17.5	12°32.6	232°08.6	-22°27.7	203°40.4	-21°58.0
Mer.pass.:14:14		v-0.7 d0.1 m-4.0		v0.9 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	146°40.9	220°31.0	-20°58.5	117°18.3	12°33.3	247°10.6	-22°27.7	218°42.6	-21°57.9
1	161°43.4	235°30.4	-20°58.4	132°19.2	12°33.9	262°12.7	-22°27.7	233°44.8	-21°57.9
2	176°45.9	250°29.7	-20°58.2	147°20.1	12°34.5	277°14.8	-22°27.8	248°47.0	-21°57.9
3	191°48.3	265°29.0	-20°58.0	162°20.9	12°35.1	292°16.9	-22°27.8	263°49.2	-21°57.9
4	206°50.8	280°28.4	-20°57.9	177°21.8	12°35.7	307°19.0	-22°27.8	278°51.4	-21°57.8
5	221°53.3	295°27.7	-20°57.7	192°22.6	12°36.3	322°21.0	-22°27.8	293°53.7	-21°57.8
6	236°55.7	310°27.1	-20°57.5	207°23.5	12°36.9	337°23.1	-22°27.9	308°55.9	-21°57.8
7	251°58.2	325°26.4	-20°57.4	222°24.3	12°37.6	352°25.2	-22°27.9	323°58.1	-21°57.7
8	267°00.7	340°25.8	-20°57.2	237°25.2	12°38.2	7°27.3	-22°27.9	339°00.3	-21°57.7
9	282°03.1	355°25.1	-20°57.0	252°26.0	12°38.8	22°29.3	-22°27.9	354°02.5	-21°57.7
10	297°05.6	10°24.4	-20°56.8	267°26.9	12°39.4	37°31.4	-22°28.0	9°04.7	-21°57.7
11	312°08.0	25°23.8	-20°56.7	282°27.7	12°40.0	52°33.5	-22°28.0	24°06.9	-21°57.6
12	327°10.5	40°23.1	-20°56.5	297°28.6	12°40.6	67°35.6	-22°28.0	39°09.1	-21°57.6
13	342°13.0	55°22.5	-20°56.3	312°29.4	12°41.2	82°37.7	-22°28.0	54°11.3	-21°57.6
14	357°15.4	70°21.8	-20°56.1	327°30.3	12°41.8	97°39.7	-22°28.1	69°13.5	-21°57.5
15	12°17.9	85°21.2	-20°56.0	342°31.1	12°42.5	112°41.8	-22°28.1	84°15.7	-21°57.5
16	27°20.4	100°20.5	-20°55.8	357°32.0	12°43.1	127°43.9	-22°28.1	99°17.9	-21°57.5
17	42°22.8	115°19.8	-20°55.6	12°32.8	12°43.7	142°46.0	-22°28.1	114°20.1	-21°57.5
18	57°25.3	130°19.2	-20°55.4	27°33.7	12°44.3	157°48.1	-22°28.2	129°22.3	-21°57.4
19	72°27.8	145°18.5	-20°55.3	42°34.5	12°44.9	172°50.2	-22°28.2	144°24.5	-21°57.4
20	87°30.2	160°17.9	-20°55.1	57°35.4	12°45.5	187°52.2	-22°28.2	159°26.7	-21°57.4
21	102°32.7	175°17.2	-20°54.9	72°36.2	12°46.1	202°54.3	-22°28.2	174°28.9	-21°57.4
22	117°35.1	190°16.6	-20°54.7	87°37.1	12°46.7	217°56.4	-22°28.3	189°31.1	-21°57.3
23	132°37.6	205°15.9	-20°54.5	102°37.9	12°47.3	232°58.5	-22°28.3	204°33.3	-21°57.3
Mer.pass.:14:10		v-0.7 d0.2 m-4.0		v0.9 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.2	-42°12.5
Schedar	349°36.5	56°38.6
Diphda	348°52.1	-17°53.2
Achernar	335°24.2	-57°08.8
Hamal	327°56.5	23°33.0
Polaris	316°09.1	89°20.9
Akamar	315°15.5	-40°14.1
Menkar	314°11.0	4°09.6
Mirfak	308°34.8	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.5	46°01.0
Bellatrix	278°27.7	6°21.8
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.1	-52°42.7
Sirius	258°30.0	-16°44.6
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.9	-59°34.4
Suhail	222°49.2	-43°30.7
Miaplacidus	221°38.0	-69°47.8
Alphard	217°52.0	-8°44.6
Regulus	207°39.0	11°52.3
Dubhe	193°46.3	61°38.8
Denebola	182°29.4	14°27.9
Gienah	175°48.0	-17°38.8
Acrux	173°04.5	-63°12.0
Gacrux	171°56.2	-57°13.0
Alioth	166°17.0	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.6	49°12.9
Hadar	148°42.1	-60°27.5
Menkent	148°02.9	-36°27.6
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.3	-60°54.4
Zubenelg.	137°01.1	-16°07.1
Kochab	137°19.9	74°04.4
Alphecca	126°07.7	26°39.0
Antares	112°21.6	-26°28.2
Atria	107°20.1	-69°03.3
Sabik	102°08.2	-15°44.8
Shaula	96°16.9	-37°06.8
Rasalhague	96°03.0	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.7	38°47.9
Nunki	75°53.8	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.7	-56°40.3
Deneb	49°29.3	45°20.8
Enif	33°43.7	9°57.7
Alnair	27°39.4	-46°52.2
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/2/1	SHA	Mer.pass
Venus	76°19.8	09:16
Mars	331°54.6	16:13
Jupiter	100°48.5	07:37
Saturn	72°14.4	09:31

2019/2/1	SHA	Mer.pass
Venus	75°04.9	09:17
Mars	331°16.0	16:11
Jupiter	100°39.1	07:34
Saturn	72°08.1	09:27

2019/2/1	SHA	Mer.pass
Venus	73°50.1	09:18
Mars	330°37.4	16:10
Jupiter	100°29.7	07:30
Saturn	72°01.7	09:24

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°27.7	-12°51.0	63°28.1	6.6	20°12.1	4.7	58.8
1	191°27.7	-12°50.1	77°53.7	6.6	20°16.7	4.6	58.9
2	206°27.7	-12°49.3	92°19.2	6.5	20°21.3	4.5	58.9
3	221°27.7	-12°48.4	106°44.6	6.4	20°25.7	4.4	59.0
4	236°27.8	-12°47.5	121°10.0	6.3	20°30.0	4.2	59.0
5	251°27.8	-12°46.7	135°35.2	6.2	20°34.1	4.1	59.0
6	266°27.8	-12°45.8	150°00.4	6.1	20°38.2	4.0	59.1
7	281°27.8	-12°45.0	164°25.5	6.0	20°42.1	3.8	59.1
8	296°27.9	-12°44.1	178°50.5	6.0	20°45.9	3.7	59.2
9	311°27.9	-12°43.3	193°15.4	5.9	20°49.5	3.6	59.2
10	326°27.9	-12°42.4	207°40.3	5.8	20°53.0	3.4	59.2
11	341°28.0	-12°41.5	222°05.0	5.7	20°56.4	3.3	59.3
12	356°28.0	-12°40.7	236°29.7	5.6	20°59.6	3.2	59.3
13	11°28.0	-12°39.8	250°54.3	5.6	21°02.8	3.0	59.3
14	26°28.1	-12°39.0	265°18.8	5.5	21°05.7	2.9	59.4
15	41°28.1	-12°38.1	279°43.3	5.4	21°08.6	2.8	59.4
16	56°28.1	-12°37.3	294°07.7	5.3	21°11.3	2.6	59.5
17	71°28.1	-12°36.4	308°32.0	5.3	21°13.9	2.5	59.5
18	86°28.2	-12°35.5	322°56.2	5.2	21°16.3	2.4	59.5
19	101°28.2	-12°34.7	337°20.4	5.1	21°18.6	2.2	59.6
20	116°28.2	-12°33.8	351°44.5	5.1	21°20.7	2.1	59.6
21	131°28.3	-12°32.9	6°08.5	5.0	21°22.7	1.9	59.6
22	146°28.3	-12°32.1	20°32.4	4.9	21°24.5	1.8	59.7
23	161°28.3	-12°31.2	34°56.3	4.9	21°26.3	1.6	59.7
	SD.=16.2	d=0.9			S.D.=16.1		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°28.4	-12°30.4	49°20.2	4.8	21°27.8	1.5	59.8
1	191°28.4	-12°29.5	63°43.9	4.7	21°29.2	1.3	59.8
2	206°28.4	-12°28.6	78°07.6	4.7	21°30.5	1.2	59.8
3	221°28.5	-12°27.8	92°31.2	4.6	21°31.6	1.0	59.9
4	236°28.5	-12°26.9	106°54.8	4.6	21°32.6	0.9	59.9
5	251°28.6	-12°26.0	121°18.4	4.5	21°33.4	0.7	59.9
6	266°28.6	-12°25.2	135°41.8	4.4	21°34.1	0.6	60.0
7	281°28.6	-12°24.3	150°05.2	4.4	21°34.6	0.4	60.0
8	296°28.7	-12°23.5	164°28.6	4.3	21°35.0	0.3	60.0
9	311°28.7	-12°22.6	178°51.9	4.3	21°35.2	0.1	60.1
10	326°28.7	-12°21.7	193°15.2	4.2	21°35.3	-0.0	60.1
11	341°28.8	-12°20.9	207°38.4	4.2	21°35.2	-0.2	60.1
12	356°28.8	-12°20.0	222°01.6	4.1	21°35.0	-0.3	60.2
13	11°28.8	-12°19.1	236°24.7	4.1	21°34.6	-0.5	60.2
14	26°28.9	-12°18.3	250°47.8	4.1	21°34.0	-0.6	60.2
15	41°28.9	-12°17.4	265°10.8	4.0	21°33.3	-0.8	60.3
16	56°29.0	-12°16.5	279°33.8	4.0	21°32.4	-0.9	60.3
17	71°29.0	-12°15.6	293°56.8	4.0	21°31.4	-1.1	60.3
18	86°29.0	-12°14.8	308°19.7	3.9	21°30.3	-1.3	60.4
19	101°29.1	-12°13.9	322°42.6	3.9	21°28.9	-1.4	60.4
20	116°29.1	-12°13.0	337°05.5	3.9	21°27.4	-1.6	60.4
21	131°29.2	-12°12.2	351°28.3	3.8	21°25.8	-1.7	60.5
22	146°29.2	-12°11.3	5°51.1	3.8	21°24.0	-1.9	60.5
23	161°29.2	-12°10.4	20°13.9	3.8	21°22.0	-2.0	60.5
	SD.=16.2	d=0.9			S.D.=16.3		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°29.3	-12°09.6	34°36.7	3.8	21°19.9	-2.2	60.6
1	191°29.3	-12°08.7	48°59.4	3.7	21°17.6	-2.4	60.6
2	206°29.4	-12°07.8	63°22.2	3.7	21°15.2	-2.5	60.6
3	221°29.4	-12°06.9	77°44.9	3.7	21°12.6	-2.7	60.6
4	236°29.5	-12°06.1	92°07.6	3.7	21°09.9	-2.8	60.7
5	251°29.5	-12°05.2	106°30.2	3.7	21°07.0	-3.0	60.7
6	266°29.5	-12°04.3	120°52.9	3.7	21°03.9	-3.1	60.7
7	281°29.6	-12°03.5	135°15.5	3.6	21°00.7	-3.3	60.7
8	296°29.6	-12°02.6	149°38.2	3.6	20°57.3	-3.5	60.8
9	311°29.7	-12°01.7	164°00.8	3.6	20°53.8	-3.6	60.8
10	326°29.7	-12°00.8	178°23.5	3.6	20°50.1	-3.8	60.8
11	341°29.8	-11°60.0	192°46.1	3.6	20°46.2	-3.9	60.9
12	356°29.8	-11°59.1	207°08.7	3.6	20°42.2	-4.1	60.9
13	11°29.9	-11°58.2	221°31.4	3.6	20°38.0	-4.2	60.9
14	26°29.9	-11°57.3	235°54.0	3.6	20°33.7	-4.4	60.9
15	41°29.9	-11°56.5	250°16.6	3.6	20°29.2	-4.6	60.9
16	56°30.0	-11°55.6	264°39.3	3.6	20°24.6	-4.7	61.0
17	71°30.0	-11°54.7	279°01.9	3.7	20°19.8	-4.9	61.0
18	86°30.1	-11°53.8	293°24.6	3.7	20°14.9	-5.0	61.0
19	101°30.1	-11°53.0	307°47.3	3.7	20°09.8	-5.2	61.0
20	116°30.2	-11°52.1	322°09.9	3.7	20°04.5	-5.3	61.1
21	131°30.2	-11°51.2	336°32.7	3.7	19°59.1	-5.5	61.1
22	146°30.3	-11°50.3	350°55.4	3.7	19°53.6	-5.6	61.1
23	161°30.3	-11°49.4	5°18.1	3.8	19°47.9	-5.8	61.1
	SD.=16.2	d=0.9			S.D.=16.5		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:12	07:31	08:49	15:40	16:59	18:19
70	06:10	07:22	08:30	15:59	17:08	18:20
68	06:09	07:14	08:15	16:14	17:16	18:21
66	06:08	07:08	08:03	16:27	17:22	18:22
64	06:06	07:02	07:53	16:37	17:28	18:23
62	06:05	06:57	07:44	16:45	17:32	18:24
60	06:04	06:53	07:36	16:53	17:37	18:25
58	06:03	06:49	07:30	16:59	17:41	18:26
56	06:02	06:45	07:24	17:05	17:44	18:28
54	06:01	06:42	07:18	17:11	17:47	18:29
52	05:59	06:39	07:14	17:15	17:50	18:30
50	05:58	06:36	07:09	17:20	17:53	18:31
45	05:56	06:30	06:60	17:29	17:59	18:33
40	05:53	06:24	06:52	17:37	18:04	18:36
35	05:50	06:19	06:45	17:43	18:09	18:39
30	05:47	06:15	06:39	17:49	18:14	18:42
20	05:40	06:06	06:29	17:60	18:22	18:48
10	05:33	05:58	06:20	18:09	18:30	18:55
0	05:25	05:50	06:11	18:17	18:39	19:03
-10	05:15	05:40	06:02	18:26	18:48	19:13
-20	05:03	05:29	05:52	18:36	18:58	19:25
-30	04:46	05:16	05:41	18:47	19:12	19:41
-35	04:36	05:08	05:34	18:53	19:20	19:51
-40	04:24	04:58	05:27	19:01	19:29	20:03
-45	04:08	04:47	05:18	19:09	19:40	20:19
-50	03:48	04:32	05:08	19:19	19:55	20:38
-52	03:38	04:26	05:03	19:24	20:01	20:48
-54	03:27	04:18	04:57	19:30	20:09	20:59
-56	03:14	04:09	04:51	19:35	20:17	21:12
-58	02:58	03:59	04:44	19:42	20:27	21:27
-60	02:38	03:48	04:37	19:50	20:38	21:46

		Moonrise			**Moonset**	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	09:31	10:02	11:38	06:33	08:07	08:42
66	10:17	11:02	12:24	05:47	07:07	07:55
64	10:47	11:37	12:54	05:18	06:33	07:25
62	11:10	12:02	13:17	04:55	06:07	07:02
60	11:28	12:22	13:35	04:37	05:48	06:43
58	11:43	12:38	13:50	04:22	05:31	06:28
56	11:57	12:52	14:03	04:09	05:17	06:15
54	12:08	13:04	14:14	03:58	05:05	06:03
52	12:18	13:15	14:24	03:48	04:55	05:53
50	12:27	13:24	14:33	03:39	04:45	05:44
45	12:46	13:44	14:52	03:20	04:25	05:25
40	13:02	14:00	15:07	03:05	04:09	05:09
35	13:15	14:14	15:20	02:52	03:55	04:56
30	13:27	14:26	15:31	02:41	03:44	04:44
20	13:47	14:46	15:51	02:22	03:23	04:24
10	14:04	15:04	16:07	02:05	03:05	04:07
0	14:20	15:21	16:23	01:50	02:49	03:50
-10	14:36	15:38	16:39	01:34	02:32	03:34
-20	14:54	15:55	16:55	01:17	02:14	03:16
-30	15:14	16:16	17:15	00:58	01:54	02:56
-35	15:26	16:28	17:26	00:47	01:42	02:44
-40	15:39	16:42	17:39	00:34	01:28	02:31
-45	15:56	16:58	17:54	00:19	01:12	02:15
-50	16:15	17:18	18:12	00:01	00:52	01:55
-52	16:25	17:28	18:21	–:–	00:42	01:45
-54	16:35	17:39	18:31	–:–	00:31	01:34
-56	16:47	17:51	18:42	–:–	00:19	01:22
-58	17:01	18:05	18:54	–:–	00:05	01:08
-60	17:18	18:22	19:09	23:49	–:–	00:52

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	14:09	14:08	12:14	20:34	08:04	11(77%)
16	14:06	14:05	12:14	21:35	09:04	12(86%)
17	14:03	14:01	12:14	22:37	10:06	13(93%)

February 18, 19 ,20 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	147°40.1	220°15.2	-20°54.3	117°38.8	12°48.0	248°00.6	-22°28.3	219°35.5	-21°57.3
1	162°42.5	235°14.6	-20°54.1	132°39.6	12°48.6	263°02.7	-22°28.3	234°37.7	-21°57.2
2	177°45.0	250°13.9	-20°54.0	147°40.5	12°49.2	278°04.7	-22°28.4	249°39.9	-21°57.2
3	192°47.5	265°13.3	-20°53.8	162°41.3	12°49.8	293°06.8	-22°28.4	264°42.1	-21°57.2
4	207°49.9	280°12.6	-20°53.6	177°42.2	12°50.4	308°08.9	-22°28.4	279°44.3	-21°57.2
5	222°52.4	295°11.9	-20°53.4	192°43.0	12°51.0	323°11.0	-22°28.4	294°46.5	-21°57.1
6	237°54.9	310°11.3	-20°53.2	207°43.9	12°51.6	338°13.1	-22°28.5	309°48.7	-21°57.1
7	252°57.3	325°10.6	-20°53.0	222°44.7	12°52.2	353°15.2	-22°28.5	324°50.9	-21°57.1
8	267°59.8	340°10.0	-20°52.8	237°45.6	12°52.8	8°17.2	-22°28.5	339°53.1	-21°57.0
9	283°02.3	355°09.3	-20°52.6	252°46.4	12°53.4	23°19.3	-22°28.5	354°55.3	-21°57.0
10	298°04.7	10°08.7	-20°52.4	267°47.3	12°54.0	38°21.4	-22°28.6	9°57.5	-21°57.0
11	313°07.2	25°08.0	-20°52.2	282°48.1	12°54.7	53°23.5	-22°28.6	24°59.7	-21°57.0
12	328°09.6	40°07.3	-20°52.0	297°49.0	12°55.3	68°25.6	-22°28.6	40°01.9	-21°56.9
13	343°12.1	55°06.7	-20°51.8	312°49.8	12°55.9	83°27.7	-22°28.6	55°04.2	-21°56.9
14	358°14.6	70°06.0	-20°51.6	327°50.7	12°56.5	98°29.8	-22°28.7	70°06.4	-21°56.9
15	13°17.0	85°05.4	-20°51.4	342°51.5	12°57.1	113°31.8	-22°28.7	85°08.6	-21°56.8
16	28°19.5	100°04.7	-20°51.2	357°52.4	12°57.7	128°33.9	-22°28.7	100°10.8	-21°56.8
17	43°22.0	115°04.0	-20°51.0	12°53.2	12°58.3	143°36.0	-22°28.7	115°13.0	-21°56.8
18	58°24.4	130°03.4	-20°50.8	27°54.1	12°58.9	158°38.1	-22°28.8	130°15.2	-21°56.8
19	73°26.9	145°02.7	-20°50.6	42°54.9	12°59.5	173°40.2	-22°28.8	145°17.4	-21°56.7
20	88°29.4	160°02.1	-20°50.4	57°55.8	13°00.1	188°42.3	-22°28.8	160°19.6	-21°56.7
21	103°31.8	175°01.4	-20°50.2	72°56.6	13°00.7	203°44.4	-22°28.8	175°21.8	-21°56.7
22	118°34.3	190°00.8	-20°50.0	87°57.5	13°01.3	218°46.4	-22°28.9	190°24.0	-21°56.6
23	133°36.8	205°00.1	-20°49.8	102°58.3	13°01.9	233°48.5	-22°28.9	205°26.2	-21°56.6
Mer.pass.:14:07		v-0.7 d0.2 m-4.0		v0.9 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	148°39.2	219°59.4	-20°49.6	117°59.2	13°02.6	248°50.6	-22°28.9	220°28.4	-21°56.6
1	163°41.7	234°58.8	-20°49.3	133°00.0	13°03.2	263°52.7	-22°28.9	235°30.6	-21°56.6
2	178°44.1	249°58.1	-20°49.1	148°00.9	13°03.8	278°54.8	-22°29.0	250°32.8	-21°56.5
3	193°46.6	264°57.5	-20°48.9	163°01.7	13°04.4	293°56.9	-22°29.0	265°35.0	-21°56.5
4	208°49.1	279°56.8	-20°48.7	178°02.6	13°05.0	308°59.0	-22°29.0	280°37.2	-21°56.5
5	223°51.5	294°56.1	-20°48.5	193°03.4	13°05.6	324°01.1	-22°29.0	295°39.4	-21°56.5
6	238°54.0	309°55.5	-20°48.3	208°04.3	13°06.2	339°03.2	-22°29.0	310°41.6	-21°56.4
7	253°56.5	324°54.8	-20°48.1	223°05.1	13°06.8	354°05.3	-22°29.1	325°43.9	-21°56.4
8	268°58.9	339°54.2	-20°47.8	238°06.0	13°07.4	9°07.3	-22°29.1	340°46.1	-21°56.4
9	284°01.4	354°53.5	-20°47.6	253°06.8	13°08.0	24°09.4	-22°29.1	355°48.3	-21°56.3
10	299°03.9	9°52.8	-20°47.4	268°07.6	13°08.6	39°11.5	-22°29.1	10°50.5	-21°56.3
11	314°06.3	24°52.2	-20°47.2	283°08.5	13°09.2	54°13.6	-22°29.2	25°52.7	-21°56.3
12	329°08.8	39°51.5	-20°46.9	298°09.3	13°09.8	69°15.7	-22°29.2	40°54.9	-21°56.3
13	344°11.3	54°50.9	-20°46.7	313°10.2	13°10.4	84°17.8	-22°29.2	55°57.1	-21°56.2
14	359°13.7	69°50.2	-20°46.5	328°11.0	13°11.0	99°19.9	-22°29.2	70°59.3	-21°56.2
15	14°16.2	84°49.6	-20°46.3	343°11.9	13°11.6	114°22.0	-22°29.3	86°01.5	-21°56.2
16	29°18.6	99°48.9	-20°46.0	358°12.7	13°12.2	129°24.1	-22°29.3	101°03.7	-21°56.1
17	44°21.1	114°48.2	-20°45.8	13°13.6	13°12.8	144°26.2	-22°29.3	116°05.9	-21°56.1
18	59°23.6	129°47.6	-20°45.6	28°14.4	13°13.4	159°28.3	-22°29.3	131°08.1	-21°56.1
19	74°26.0	144°46.9	-20°45.4	43°15.3	13°14.0	174°30.4	-22°29.4	146°10.3	-21°56.1
20	89°28.5	159°46.3	-20°45.1	58°16.1	13°14.6	189°32.4	-22°29.4	161°12.5	-21°56.0
21	104°31.0	174°45.6	-20°44.9	73°17.0	13°15.2	204°34.5	-22°29.4	176°14.8	-21°56.0
22	119°33.4	189°44.9	-20°44.7	88°17.8	13°15.8	219°36.6	-22°29.4	191°17.0	-21°56.0
23	134°35.9	204°44.3	-20°44.4	103°18.6	13°16.4	234°38.7	-22°29.4	206°19.2	-21°55.9
Mer.pass.:14:03		v-0.7 d0.2 m-4.0		v0.8 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	149°38.4	219°43.6	-20°44.2	118°19.5	13°17.0	249°40.8	-22°29.5	221°21.4	-21°55.9
1	164°40.8	234°43.0	-20°44.0	133°20.3	13°17.6	264°42.9	-22°29.5	236°23.6	-21°55.9
2	179°43.3	249°42.3	-20°43.7	148°21.2	13°18.2	279°45.0	-22°29.5	251°25.8	-21°55.9
3	194°45.7	264°41.6	-20°43.5	163°22.0	13°18.8	294°47.1	-22°29.5	266°28.0	-21°55.8
4	209°48.2	279°41.0	-20°43.3	178°22.9	13°19.4	309°49.2	-22°29.6	281°30.2	-21°55.8
5	224°50.7	294°40.3	-20°43.0	193°23.7	13°20.0	324°51.3	-22°29.6	296°32.4	-21°55.8
6	239°53.1	309°39.7	-20°42.8	208°24.6	13°20.6	339°53.4	-22°29.6	311°34.6	-21°55.8
7	254°55.6	324°39.0	-20°42.5	223°25.4	13°21.2	354°55.5	-22°29.6	326°36.8	-21°55.7
8	269°58.1	339°38.3	-20°42.3	238°26.3	13°21.8	9°57.6	-22°29.7	341°39.0	-21°55.7
9	285°00.5	354°37.7	-20°42.0	253°27.1	13°22.4	24°59.7	-22°29.7	356°41.3	-21°55.7
10	300°03.0	9°37.0	-20°41.8	268°27.9	13°23.0	40°01.8	-22°29.7	11°43.5	-21°55.6
11	315°05.5	24°36.4	-20°41.6	283°28.8	13°23.6	55°03.9	-22°29.7	26°45.7	-21°55.6
12	330°07.9	39°35.7	-20°41.3	298°29.6	13°24.2	70°06.0	-22°29.8	41°47.9	-21°55.6
13	345°10.4	54°35.0	-20°41.1	313°30.5	13°24.8	85°08.1	-22°29.8	56°50.1	-21°55.6
14	0°12.9	69°34.4	-20°40.8	328°31.3	13°25.4	100°10.2	-22°29.8	71°52.3	-21°55.5
15	15°15.3	84°33.7	-20°40.6	343°32.2	13°26.0	115°12.3	-22°29.8	86°54.5	-21°55.5
16	30°17.8	99°33.1	-20°40.3	358°33.0	13°26.6	130°14.4	-22°29.8	101°56.7	-21°55.5
17	45°20.2	114°32.4	-20°40.1	13°33.8	13°27.2	145°16.5	-22°29.9	116°58.9	-21°55.4
18	60°22.7	129°31.7	-20°39.8	28°34.7	13°27.8	160°18.6	-22°29.9	132°01.1	-21°55.4
19	75°25.2	144°31.1	-20°39.6	43°35.5	13°28.4	175°20.7	-22°29.9	147°03.4	-21°55.4
20	90°27.6	159°30.4	-20°39.3	58°36.4	13°29.0	190°22.8	-22°29.9	162°05.6	-21°55.4
21	105°30.1	174°29.8	-20°39.0	73°37.2	13°29.6	205°24.9	-22°30.0	177°07.8	-21°55.3
22	120°32.6	189°29.1	-20°38.8	88°38.1	13°30.2	220°27.0	-22°30.0	192°10.0	-21°55.3
23	135°35.0	204°28.5	-20°38.5	103°38.9	13°30.8	235°29.1	-22°30.0	207°12.2	-21°55.3
Mer.pass.:13:59		v-0.7 d0.2 m-4.0		v0.8 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Stars	SHA	Dec
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.2	-42°12.4
Schedar	349°36.5	56°38.5
Diphda	348°52.1	-17°53.2
Achernar	335°24.2	-57°08.8
Hamal	327°56.5	23°33.0
Polaris	316°10.5	89°20.9
Akamar	315°15.5	-40°14.1
Menkar	314°11.0	4°09.6
Mirfak	308°34.8	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.5	46°01.1
Bellatrix	278°27.7	6°21.8
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.1	-52°42.7
Sirius	258°30.0	-16°44.7
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.9	-59°34.4
Suhail	222°49.2	-43°30.7
Miaplacidus	221°38.0	-69°47.8
Alphard	217°51.9	-8°44.6
Regulus	207°39.0	11°52.3
Dubhe	193°46.3	61°38.8
Denebola	182°29.4	14°27.9
Gienah	175°48.0	-17°38.8
Acrux	173°04.4	-63°12.1
Gacrux	171°56.1	-57°13.0
Alioth	166°16.9	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.6	49°12.9
Hadar	148°42.1	-60°27.6
Menkent	148°02.8	-36°27.6
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.3	-60°54.5
Zubenelg.	137°01.0	-16°07.1
Kochab	137°19.8	74°04.4
Alphecca	126°07.7	26°38.9
Antares	112°21.6	-26°28.2
Atria	107°20.0	-69°03.3
Sabik	102°08.2	-15°44.8
Shaula	96°16.8	-37°06.8
Rasalhague	96°03.0	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°53.8	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.7	-56°40.3
Deneb	49°29.3	45°20.8
Enif	33°43.7	9°57.6
Alnair	27°39.4	-46°52.2
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.4

2019/2/1	SHA	Mer.pass
Venus	72°35.2	09:19
Mars	329°58.7	16:08
Jupiter	100°20.5	07:27
Saturn	71°55.4	09:20

2019/2/1	SHA	Mer.pass
Venus	71°20.2	09:20
Mars	329°20.0	16:07
Jupiter	100°11.4	07:24
Saturn	71°49.2	09:17

2019/2/2	SHA	Mer.pass
Venus	70°05.3	09:22
Mars	328°41.1	16:06
Jupiter	100°02.5	07:20
Saturn	71°43.0	09:13

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°30.4	-11°48.6	19°40.9	3.8	19°42.0	-5.9	61.1
1	191°30.4	-11°47.7	34°03.7	3.8	19°36.0	-6.1	61.2
2	206°30.5	-11°46.8	48°26.5	3.8	19°29.9	-6.2	61.2
3	221°30.5	-11°45.9	62°49.3	3.8	19°23.6	-6.4	61.2
4	236°30.6	-11°45.0	77°12.2	3.9	19°17.1	-6.5	61.2
5	251°30.6	-11°44.2	91°35.1	3.9	19°10.5	-6.7	61.2
6	266°30.7	-11°43.3	105°58.0	3.9	19°03.8	-6.8	61.2
7	281°30.7	-11°42.4	120°20.9	4.0	18°56.9	-7.0	61.3
8	296°30.8	-11°41.5	134°43.9	4.0	18°49.9	-7.1	61.3
9	311°30.8	-11°40.6	149°06.9	4.0	18°42.7	-7.2	61.3
10	326°30.9	-11°39.8	163°30.0	4.1	18°35.4	-7.4	61.3
11	341°30.9	-11°38.9	177°53.1	4.1	18°27.9	-7.5	61.3
12	356°31.0	-11°38.0	192°16.2	4.2	18°20.3	-7.7	61.3
13	11°31.0	-11°37.1	206°39.4	4.2	18°12.6	-7.8	61.3
14	26°31.1	-11°36.2	221°02.6	4.2	18°04.7	-7.9	61.4
15	41°31.1	-11°35.3	235°25.9	4.3	17°56.7	-8.1	61.4
16	56°31.2	-11°34.5	249°49.2	4.3	17°48.6	-8.2	61.4
17	71°31.3	-11°33.6	264°12.5	4.4	17°40.3	-8.3	61.4
18	86°31.3	-11°32.7	278°35.9	4.4	17°31.9	-8.5	61.4
19	101°31.4	-11°31.8	292°59.4	4.5	17°23.4	-8.6	61.4
20	116°31.4	-11°30.9	307°22.9	4.5	17°14.8	-8.7	61.4
21	131°31.5	-11°30.0	321°46.4	4.6	17°06.0	-8.8	61.4
22	146°31.5	-11°29.2	336°10.0	4.6	16°57.1	-9.0	61.4
23	161°31.6	-11°28.3	350°33.7	4.7	16°48.0	-9.1	61.4
	SD.=16.2	d=0.9			S.D.=16.7		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°31.6	-11°27.4	4°57.4	4.7	16°38.9	-9.2	61.4
1	191°31.7	-11°26.5	19°21.1	4.8	16°29.6	-9.3	61.4
2	206°31.8	-11°25.6	33°45.0	4.8	16°20.2	-9.5	61.4
3	221°31.8	-11°24.7	48°08.8	4.9	16°10.6	-9.6	61.4
4	236°31.9	-11°23.8	62°32.8	5.0	16°01.0	-9.7	61.5
5	251°31.9	-11°22.9	76°56.7	5.0	15°51.3	-9.8	61.5
6	266°32.0	-11°22.1	91°20.8	5.1	15°41.4	-9.9	61.5
7	281°32.0	-11°21.2	105°44.9	5.1	15°31.4	-10.0	61.5
8	296°32.1	-11°20.3	120°09.0	5.2	15°21.3	-10.1	61.5
9	311°32.2	-11°19.4	134°33.3	5.3	15°11.1	-10.3	61.5
10	326°32.2	-11°18.5	148°57.6	5.3	15°00.8	-10.4	61.5
11	341°32.3	-11°17.6	163°21.9	5.4	14°50.4	-10.5	61.5
12	356°32.3	-11°16.7	177°46.3	5.4	14°39.9	-10.6	61.5
13	11°32.4	-11°15.8	192°10.8	5.5	14°29.2	-10.7	61.5
14	26°32.5	-11°14.9	206°35.3	5.6	14°18.5	-10.8	61.5
15	41°32.5	-11°14.1	220°59.9	5.6	14°07.7	-10.9	61.4
16	56°32.6	-11°13.2	235°24.6	5.7	13°56.8	-11.0	61.4
17	71°32.6	-11°12.3	249°49.3	5.8	13°45.8	-11.1	61.4
18	86°32.7	-11°11.4	264°14.1	5.8	13°34.6	-11.2	61.4
19	101°32.8	-11°10.5	278°39.0	5.9	13°23.4	-11.2	61.4
20	116°32.8	-11°09.6	293°03.9	6.0	13°12.1	-11.3	61.4
21	131°32.9	-11°08.7	307°28.9	6.0	13°00.8	-11.4	61.4
22	146°32.9	-11°07.8	321°54.0	6.1	12°49.3	-11.5	61.4
23	161°33.0	-11°06.9	336°19.1	6.2	12°37.7	-11.6	61.4
	SD.=16.2	d=0.9			S.D.=16.8		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°33.1	-11°06.0	350°44.3	6.2	12°26.1	-11.7	61.4
1	191°33.1	-11°05.1	5°09.6	6.3	12°14.4	-11.8	61.4
2	206°33.2	-11°04.2	19°34.9	6.4	12°02.6	-11.8	61.4
3	221°33.3	-11°03.3	34°00.3	6.4	11°50.7	-11.9	61.4
4	236°33.3	-11°02.4	48°25.8	6.5	11°38.8	-12.0	61.4
5	251°33.4	-11°01.5	62°51.3	6.6	11°26.7	-12.1	61.3
6	266°33.5	-11°00.7	77°16.9	6.6	11°14.6	-12.1	61.3
7	281°33.5	-10°59.8	91°42.6	6.7	11°02.5	-12.2	61.3
8	296°33.6	-10°58.9	106°08.3	6.8	10°50.2	-12.3	61.3
9	311°33.7	-10°58.0	120°34.1	6.8	10°37.9	-12.3	61.3
10	326°33.7	-10°57.1	134°60.0	6.9	10°25.5	-12.4	61.3
11	341°33.8	-10°56.2	149°25.9	7.0	10°13.1	-12.5	61.3
12	356°33.8	-10°55.3	163°51.9	7.0	10°00.6	-12.5	61.2
13	11°33.9	-10°54.4	178°18.0	7.1	9°48.1	-12.6	61.2
14	26°34.0	-10°53.5	192°44.1	7.2	9°35.4	-12.6	61.2
15	41°34.1	-10°52.6	207°10.4	7.2	9°22.8	-12.7	61.2
16	56°34.1	-10°51.7	221°36.6	7.3	9°10.1	-12.7	61.2
17	71°34.2	-10°50.8	236°03.0	7.4	8°57.3	-12.8	61.2
18	86°34.3	-10°49.9	250°29.4	7.4	8°44.5	-12.8	61.1
19	101°34.3	-10°49.0	264°55.8	7.5	8°31.6	-12.9	61.1
20	116°34.4	-10°48.1	279°22.4	7.6	8°18.7	-12.9	61.1
21	131°34.5	-10°47.2	293°49.0	7.6	8°05.7	-13.0	61.1
22	146°34.5	-10°46.3	308°15.6	7.7	7°52.7	-13.0	61.1
23	161°34.6	-10°45.4	322°42.4	7.8	7°39.6	-13.1	61.0
	SD.=16.2	d=0.9			S.D.=16.7		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:58	07:17	08:32	15:57	17:12	18:32
70	05:58	07:09	08:16	16:13	17:20	18:31
68	05:58	07:03	08:03	16:27	17:26	18:31
66	05:58	06:57	07:52	16:37	17:32	18:31
64	05:57	06:53	07:43	16:46	17:36	18:32
62	05:57	06:49	07:35	16:54	17:40	18:32
60	05:56	06:45	07:28	17:01	17:44	18:32
58	05:56	06:42	07:22	17:07	17:47	18:33
56	05:55	06:38	07:17	17:12	17:50	18:34
54	05:55	06:36	07:12	17:17	17:53	18:34
52	05:54	06:33	07:08	17:21	17:55	18:35
50	05:53	06:31	07:04	17:25	17:58	18:35
45	05:51	06:25	06:55	17:33	18:03	18:37
40	05:49	06:21	06:48	17:40	18:08	18:39
35	05:47	06:16	06:42	17:46	18:12	18:41
30	05:44	06:12	06:37	17:52	18:16	18:44
20	05:39	06:05	06:27	18:01	18:23	18:49
10	05:32	05:57	06:19	18:09	18:31	18:55
0	05:25	05:49	06:10	18:17	18:38	19:03
-10	05:16	05:41	06:02	18:25	18:47	19:12
-20	05:04	05:31	05:53	18:34	18:57	19:23
-30	04:49	05:19	05:43	18:44	19:09	19:38
-35	04:40	05:11	05:37	18:50	19:16	19:47
-40	04:28	05:02	05:30	18:56	19:25	19:59
-45	04:14	04:51	05:23	19:04	19:35	20:13
-50	03:55	04:38	05:13	19:14	19:48	20:31
-52	03:46	04:32	05:08	19:18	19:55	20:40
-54	03:35	04:25	05:03	19:23	20:01	20:51
-56	03:23	04:17	04:58	19:28	20:09	21:02
-58	03:09	04:08	04:52	19:34	20:18	21:16
-60	02:51	03:57	04:45	19:41	20:29	21:33

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	14:56	17:24	–:–	09:43	09:16
70	12:60	15:26	17:39	09:31	09:11	08:60
68	13:42	15:48	17:50	08:48	08:48	08:46
66	14:11	16:05	17:59	08:18	08:30	08:35
64	14:32	16:19	18:07	07:56	08:15	08:26
62	14:49	16:31	18:13	07:38	08:02	08:18
60	15:04	16:41	18:19	07:23	07:51	08:12
58	15:16	16:49	18:24	07:11	07:42	08:05
56	15:27	16:57	18:28	06:59	07:34	08:00
54	15:36	17:03	18:32	06:50	07:26	07:55
52	15:44	17:09	18:36	06:41	07:19	07:51
50	15:51	17:15	18:39	06:33	07:13	07:47
45	16:07	17:26	18:46	06:16	07:00	07:38
40	16:20	17:36	18:52	06:03	06:50	07:31
35	16:31	17:44	18:57	05:51	06:40	07:24
30	16:41	17:51	19:01	05:41	06:32	07:19
20	16:57	18:04	19:09	05:23	06:18	07:09
10	17:12	18:15	19:16	05:07	06:05	07:00
0	17:25	18:25	19:22	04:53	05:54	06:52
-10	17:38	18:35	19:28	04:38	05:42	06:44
-20	17:53	18:46	19:35	04:22	05:29	06:35
-30	18:09	18:58	19:42	04:04	05:14	06:25
-35	18:18	19:05	19:46	03:53	05:06	06:19
-40	18:29	19:13	19:51	03:41	04:56	06:12
-45	18:42	19:22	19:57	03:26	04:44	06:04
-50	18:57	19:33	20:04	03:09	04:30	05:55
-52	19:04	19:38	20:07	03:00	04:24	05:50
-54	19:12	19:44	20:10	02:51	04:16	05:45
-56	19:21	19:50	20:14	02:40	04:08	05:40
-58	19:31	19:57	20:18	02:28	03:59	05:34
-60	19:42	20:05	20:23	02:14	03:48	05:27

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	13:58	13:56	12:13	23:39	11:08	14(98%)
19	13:53	13:51	12:13	00:38	12:09	15(100%)
20	13:48	13:45	12:13	00:38	13:07	16(99%)

February 21, 22 ,23 (Thu., Fri., Sat.)

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	150°37.5	219°27.8	-20°38.3	118°39.7	13°31.4	250°31.2	-22°30.0	222°14.4	-21°55.3
1	165°40.0	234°27.1	-20°38.0	133°40.6	13°32.0	265°33.3	-22°30.0	237°16.6	-21°55.2
2	180°42.4	249°26.5	-20°37.7	148°41.4	13°32.6	280°35.4	-22°30.1	252°18.8	-21°55.2
3	195°44.9	264°25.8	-20°37.5	163°42.3	13°33.2	295°37.5	-22°30.1	267°21.0	-21°55.2
4	210°47.3	279°25.2	-20°37.2	178°43.1	13°33.8	310°39.6	-22°30.1	282°23.3	-21°55.1
5	225°49.8	294°24.5	-20°37.0	193°44.0	13°34.4	325°41.7	-22°30.1	297°25.5	-21°55.1
6	240°52.3	309°23.8	-20°36.7	208°44.8	13°35.0	340°43.8	-22°30.2	312°27.7	-21°55.1
7	255°54.7	324°23.2	-20°36.4	223°45.6	13°35.6	355°45.9	-22°30.2	327°29.9	-21°55.1
8	270°57.2	339°22.5	-20°36.2	238°46.5	13°36.2	10°48.0	-22°30.2	342°32.1	-21°55.0
9	285°59.7	354°21.9	-20°35.9	253°47.3	13°36.8	25°50.1	-22°30.2	357°34.3	-21°55.0
10	301°02.1	9°21.2	-20°35.6	268°48.2	13°37.4	40°52.2	-22°30.2	12°36.5	-21°55.0
11	316°04.6	24°20.5	-20°35.4	283°49.0	13°38.0	55°54.3	-22°30.3	27°38.7	-21°54.9
12	331°07.1	39°19.9	-20°35.1	298°49.9	13°38.6	70°56.4	-22°30.3	42°40.9	-21°54.9
13	346°09.5	54°19.2	-20°34.8	313°50.7	13°39.2	85°58.5	-22°30.3	57°43.2	-21°54.9
14	1°12.0	69°18.6	-20°34.5	328°51.5	13°39.7	101°00.6	-22°30.3	72°45.4	-21°54.9
15	16°14.5	84°17.9	-20°34.3	343°52.4	13°40.3	116°02.7	-22°30.4	87°47.6	-21°54.8
16	31°16.9	99°17.2	-20°34.0	358°53.2	13°40.9	131°04.8	-22°30.4	102°49.8	-21°54.8
17	46°19.4	114°16.6	-20°33.7	13°54.1	13°41.5	146°06.9	-22°30.4	117°52.0	-21°54.8
18	61°21.8	129°15.9	-20°33.4	28°54.9	13°42.1	161°09.0	-22°30.4	132°54.2	-21°54.8
19	76°24.3	144°15.3	-20°33.2	43°55.7	13°42.7	176°11.1	-22°30.4	147°56.4	-21°54.7
20	91°26.8	159°14.6	-20°32.9	58°56.6	13°43.3	191°13.2	-22°30.5	162°58.6	-21°54.7
21	106°29.2	174°14.0	-20°32.6	73°57.4	13°43.9	206°15.3	-22°30.5	178°00.9	-21°54.7
22	121°31.7	189°13.3	-20°32.3	88°58.3	13°44.5	221°17.4	-22°30.5	193°03.1	-21°54.6
23	136°34.2	204°12.6	-20°32.0	103°59.1	13°45.1	236°19.5	-22°30.5	208°05.3	-21°54.6
Mer.pass.:13:55		v-0.7 d0.3 m-4.0		v0.8 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	151°36.6	219°12.0	-20°31.8	118°59.9	13°45.7	251°21.6	-22°30.6	223°07.5	-21°54.6
1	166°39.1	234°11.3	-20°31.5	134°00.8	13°46.3	266°23.7	-22°30.6	238°09.7	-21°54.6
2	181°41.6	249°10.7	-20°31.2	149°01.6	13°46.9	281°25.8	-22°30.6	253°11.9	-21°54.5
3	196°44.0	264°10.0	-20°30.9	164°02.5	13°47.5	296°27.9	-22°30.6	268°14.1	-21°54.5
4	211°46.5	279°09.3	-20°30.6	179°03.3	13°48.0	311°30.0	-22°30.6	283°16.4	-21°54.5
5	226°48.9	294°08.7	-20°30.3	194°04.1	13°48.6	326°32.2	-22°30.7	298°18.6	-21°54.4
6	241°51.4	309°08.0	-20°30.0	209°05.0	13°49.2	341°34.3	-22°30.7	313°20.8	-21°54.4
7	256°53.9	324°07.4	-20°29.7	224°05.8	13°49.8	356°36.4	-22°30.7	328°23.0	-21°54.4
8	271°56.3	339°06.7	-20°29.5	239°06.7	13°50.4	11°38.5	-22°30.7	343°25.2	-21°54.4
9	286°58.8	354°06.0	-20°29.2	254°07.5	13°51.0	26°40.6	-22°30.8	358°27.4	-21°54.3
10	302°01.3	9°05.4	-20°28.9	269°08.3	13°51.6	41°42.7	-22°30.8	13°29.6	-21°54.3
11	317°03.7	24°04.7	-20°28.6	284°09.2	13°52.2	56°44.8	-22°30.8	28°31.9	-21°54.3
12	332°06.2	39°04.1	-20°28.3	299°10.0	13°52.8	71°46.9	-22°30.8	43°34.1	-21°54.3
13	347°08.7	54°03.4	-20°28.0	314°10.8	13°53.4	86°49.0	-22°30.8	58°36.3	-21°54.2
14	2°11.1	69°02.8	-20°27.7	329°11.7	13°53.9	101°51.1	-22°30.9	73°38.5	-21°54.2
15	17°13.6	84°02.1	-20°27.4	344°12.5	13°54.5	116°53.2	-22°30.9	88°40.7	-21°54.2
16	32°16.1	99°01.4	-20°27.1	359°13.4	13°55.1	131°55.3	-22°30.9	103°42.9	-21°54.1
17	47°18.5	114°00.8	-20°26.8	14°14.2	13°55.7	146°57.5	-22°30.9	118°45.1	-21°54.1
18	62°21.0	129°00.1	-20°26.5	29°15.0	13°56.3	161°59.6	-22°30.9	133°47.4	-21°54.1
19	77°23.4	143°59.5	-20°26.2	44°15.9	13°56.9	177°01.7	-22°31.0	148°49.6	-21°54.1
20	92°25.9	158°58.8	-20°25.9	59°16.7	13°57.5	192°03.8	-22°31.0	163°51.8	-21°54.0
21	107°28.4	173°58.1	-20°25.6	74°17.6	13°58.1	207°05.9	-22°31.0	178°54.0	-21°54.0
22	122°30.8	188°57.5	-20°25.3	89°18.4	13°58.7	222°08.0	-22°31.0	193°56.2	-21°54.0
23	137°33.3	203°56.8	-20°25.0	104°19.2	13°59.2	237°10.1	-22°31.1	208°58.4	-21°53.9
Mer.pass.:13:51		v-0.7 d0.3 m-4.0		v0.8 d0.6 m1.1		v2.1 d-0.0 m-1.8		v2.2 d0.0 m0.6	

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	152°35.8	218°56.2	-20°24.7	119°20.1	13°59.8	252°12.2	-22°31.1	224°00.6	-21°53.9
1	167°38.2	233°55.5	-20°24.4	134°20.9	14°00.4	267°14.3	-22°31.1	239°02.9	-21°53.9
2	182°40.7	248°54.9	-20°24.0	149°21.7	14°01.0	282°16.5	-22°31.1	254°05.1	-21°53.9
3	197°43.2	263°54.2	-20°23.7	164°22.6	14°01.6	297°18.6	-22°31.1	269°07.3	-21°53.8
4	212°45.6	278°53.5	-20°23.4	179°23.4	14°02.2	312°20.7	-22°31.2	284°09.5	-21°53.8
5	227°48.1	293°52.9	-20°23.1	194°24.3	14°02.8	327°22.8	-22°31.2	299°11.7	-21°53.8
6	242°50.6	308°52.2	-20°22.8	209°25.1	14°03.4	342°24.9	-22°31.2	314°13.9	-21°53.8
7	257°53.0	323°51.6	-20°22.5	224°25.9	14°03.9	357°27.0	-22°31.2	329°16.2	-21°53.7
8	272°55.5	338°50.9	-20°22.2	239°26.8	14°04.5	12°29.1	-22°31.2	344°18.4	-21°53.7
9	287°57.9	353°50.3	-20°21.9	254°27.6	14°05.1	27°31.2	-22°31.3	359°20.6	-21°53.7
10	303°00.4	8°49.6	-20°21.5	269°28.4	14°05.7	42°33.4	-22°31.3	14°22.8	-21°53.6
11	318°02.9	23°48.9	-20°21.2	284°29.3	14°06.3	57°35.5	-22°31.3	29°25.0	-21°53.6
12	333°05.3	38°48.3	-20°20.9	299°30.1	14°06.9	72°37.6	-22°31.3	44°27.2	-21°53.6
13	348°07.8	53°47.6	-20°20.6	314°30.9	14°07.5	87°39.7	-22°31.3	59°29.5	-21°53.6
14	3°10.3	68°47.0	-20°20.3	329°31.8	14°08.0	102°41.8	-22°31.4	74°31.7	-21°53.5
15	18°12.7	83°46.3	-20°19.9	344°32.6	14°08.6	117°43.9	-22°31.4	89°33.9	-21°53.5
16	33°15.2	98°45.7	-20°19.6	359°33.4	14°09.2	132°46.1	-22°31.4	104°36.1	-21°53.5
17	48°17.7	113°45.0	-20°19.3	14°34.3	14°09.8	147°48.2	-22°31.4	119°38.3	-21°53.5
18	63°20.1	128°44.3	-20°19.0	29°35.1	14°10.4	162°50.3	-22°31.4	134°40.6	-21°53.4
19	78°22.6	143°43.7	-20°18.6	44°36.0	14°11.0	177°52.4	-22°31.5	149°42.8	-21°53.4
20	93°25.0	158°43.0	-20°18.3	59°36.8	14°11.5	192°54.5	-22°31.5	164°45.0	-21°53.4
21	108°27.5	173°42.4	-20°18.0	74°37.6	14°12.1	207°56.6	-22°31.5	179°47.2	-21°53.3
22	123°30.0	188°41.7	-20°17.7	89°38.5	14°12.7	222°58.8	-22°31.5	194°49.4	-21°53.3
23	138°32.4	203°41.1	-20°17.3	104°39.3	14°13.3	238°00.9	-22°31.5	209°51.6	-21°53.3
Mer.pass.:13:47		v-0.7 d0.3 m-4.0		v0.8 d0.6 m1.1		v2.1 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.2	-42°12.4
Schedar	349°36.5	56°38.5
Diphda	348°52.1	-17°53.2
Achernar	335°24.2	-57°08.8
Hamal	327°56.6	23°33.0
Polaris	316°12.1	89°20.9
Akamar	315°15.5	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°34.8	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.6	46°01.1
Bellatrix	278°27.7	6°21.8
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°56.9	7°24.4
Canopus	263°54.1	-52°42.7
Sirius	258°30.0	-16°44.7
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.9	-59°34.5
Suhail	222°49.2	-43°30.7
Miaplacidus	221°38.0	-69°47.8
Alphard	217°52.0	-8°44.6
Regulus	207°39.0	11°52.3
Dubhe	193°46.3	61°38.8
Denebola	182°29.3	14°27.8
Gienah	175°48.0	-17°38.8
Acrux	173°04.4	-63°12.1
Gacrux	171°56.1	-57°13.0
Alioth	166°16.9	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.6	49°12.9
Hadar	148°42.1	-60°27.6
Menkent	148°02.8	-36°27.6
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.2	-60°54.5
Zubenelg.	137°01.0	-16°07.1
Kochab	137°19.8	74°04.4
Alphecca	126°07.7	26°38.9
Antares	112°21.5	-26°28.2
Atria	107°20.0	-69°03.3
Sabik	102°08.2	-15°44.8
Shaula	96°16.8	-37°06.8
Rasalhague	96°03.0	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°53.8	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.7	-56°40.3
Deneb	49°29.3	45°20.8
Enif	33°43.7	9°57.6
Alnair	27°39.4	-46°52.2
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.1
Markab	13°34.8	15°18.3

2019/2/2	SHA	Mer.pass
Venus	68°50.3	09:23
Mars	328°02.3	16:04
Jupiter	99°53.7	07:17
Saturn	71°36.9	09:10

2019/2/2	SHA	Mer.pass
Venus	67°35.3	09:24
Mars	327°23.3	16:03
Jupiter	99°45.0	07:14
Saturn	71°30.9	09:06

2019/2/2	SHA	Mer.pass
Venus	66°20.4	09:25
Mars	326°44.3	16:02
Jupiter	99°36.5	07:10
Saturn	71°24.9	09:03

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°34.7	-10°44.5	337°09.1	7.8	7°26.6	-13.1	61.0
1	191°34.7	-10°43.6	351°36.0	7.9	7°13.4	-13.1	61.0
2	206°34.8	-10°42.7	6°02.9	7.9	7°00.3	-13.2	61.0
3	221°34.9	-10°41.8	20°29.9	8.0	6°47.1	-13.2	60.9
4	236°35.0	-10°40.9	34°56.9	8.1	6°33.9	-13.2	60.9
5	251°35.0	-10°40.0	49°24.0	8.1	6°20.6	-13.3	60.9
6	266°35.1	-10°39.1	63°51.2	8.2	6°07.3	-13.3	60.9
7	281°35.2	-10°38.2	78°18.4	8.3	5°54.0	-13.3	60.8
8	296°35.2	-10°37.3	92°45.7	8.3	5°40.7	-13.4	60.8
9	311°35.3	-10°36.4	107°13.0	8.4	5°27.3	-13.4	60.8
10	326°35.4	-10°35.5	121°40.4	8.4	5°13.9	-13.4	60.8
11	341°35.5	-10°34.6	136°07.9	8.5	5°00.5	-13.4	60.7
12	356°35.5	-10°33.7	150°35.4	8.5	4°47.1	-13.4	60.7
13	11°35.6	-10°32.8	165°03.0	8.6	4°33.6	-13.4	60.7
14	26°35.7	-10°31.8	179°30.6	8.7	4°20.2	-13.5	60.7
15	41°35.7	-10°30.9	193°58.3	8.7	4°06.7	-13.5	60.6
16	56°35.8	-10°30.0	208°26.0	8.8	3°53.2	-13.5	60.6
17	71°35.9	-10°29.1	222°53.8	8.8	3°39.8	-13.5	60.6
18	86°36.0	-10°28.2	237°21.7	8.9	3°26.3	-13.5	60.5
19	101°36.0	-10°27.3	251°49.6	8.9	3°12.8	-13.5	60.5
20	116°36.1	-10°26.4	266°17.5	9.0	2°59.2	-13.5	60.5
21	131°36.2	-10°25.5	280°45.6	9.0	2°45.7	-13.5	60.4
22	146°36.3	-10°24.6	295°13.6	9.1	2°32.2	-13.5	60.4
23	161°36.4	-10°23.7	309°41.7	9.1	2°18.7	-13.5	60.4
	SD.=16.2	d=0.9			S.D.=16.6		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°36.4	-10°22.8	324°09.9	9.2	2°05.2	-13.5	60.4
1	191°36.5	-10°21.9	338°38.1	9.2	1°51.7	-13.5	60.3
2	206°36.6	-10°21.0	353°06.3	9.3	1°38.2	-13.5	60.3
3	221°36.7	-10°20.1	7°34.6	9.3	1°24.7	-13.5	60.3
4	236°36.7	-10°19.2	22°03.0	9.4	1°11.2	-13.5	60.2
5	251°36.8	-10°18.2	36°31.4	9.4	0°57.7	-13.5	60.2
6	266°36.9	-10°17.3	50°59.8	9.5	0°44.2	-13.5	60.2
7	281°37.0	-10°16.4	65°28.3	9.5	0°30.8	-13.5	60.1
8	296°37.0	-10°15.5	79°56.8	9.6	0°17.3	-13.4	60.1
9	311°37.1	-10°14.6	94°25.4	9.6	0°03.9	-13.4	60.0
10	326°37.2	-10°13.7	108°54.0	9.6	-0°09.5	-13.4	60.0
11	341°37.3	-10°12.8	123°22.7	9.7	-0°22.9	-13.4	60.0
12	356°37.4	-10°11.9	137°51.4	9.7	-0°36.3	-13.4	59.9
13	11°37.4	-10°11.0	152°20.1	9.8	-0°49.7	-13.4	59.9
14	26°37.5	-10°10.1	166°48.9	9.8	-1°03.0	-13.3	59.9
15	41°37.6	-10°09.1	181°17.7	9.8	-1°16.3	-13.3	59.8
16	56°37.7	-10°08.2	195°46.6	9.9	-1°29.6	-13.3	59.8
17	71°37.8	-10°07.3	210°15.5	9.9	-1°42.9	-13.3	59.8
18	86°37.8	-10°06.4	224°44.4	9.9	-1°56.1	-13.2	59.7
19	101°37.9	-10°05.5	239°13.4	10.0	-2°09.4	-13.2	59.7
20	116°38.0	-10°04.6	253°42.4	10.0	-2°22.5	-13.2	59.6
21	131°38.1	-10°03.7	268°11.4	10.1	-2°35.7	-13.1	59.6
22	146°38.2	-10°02.8	282°40.5	10.1	-2°48.8	-13.1	59.6
23	161°38.3	-10°01.8	297°09.6	10.1	-3°01.9	-13.1	59.5
	SD.=16.2	d=0.9			S.D.=16.5		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°38.3	-10°00.9	311°38.7	10.1	-3°14.9	-13.0	59.5
1	191°38.4	-10°00.0	326°07.9	10.2	-3°28.0	-13.0	59.5
2	206°38.5	-9°59.1	340°37.1	10.2	-3°40.9	-13.0	59.4
3	221°38.6	-9°58.2	355°06.3	10.2	-3°53.9	-12.9	59.4
4	236°38.7	-9°57.3	9°35.5	10.3	-4°06.8	-12.9	59.3
5	251°38.8	-9°56.4	24°04.8	10.3	-4°19.6	-12.8	59.3
6	266°38.8	-9°55.4	38°34.1	10.3	-4°32.4	-12.8	59.3
7	281°38.9	-9°54.5	53°03.5	10.4	-4°45.2	-12.8	59.2
8	296°39.0	-9°53.6	67°32.8	10.4	-4°57.9	-12.7	59.2
9	311°39.1	-9°52.7	82°02.2	10.4	-5°10.6	-12.7	59.1
10	326°39.2	-9°51.8	96°31.6	10.4	-5°23.3	-12.6	59.1
11	341°39.3	-9°50.9	111°01.1	10.5	-5°35.8	-12.6	59.1
12	356°39.4	-9°49.9	125°30.6	10.5	-5°48.4	-12.5	59.0
13	11°39.4	-9°49.0	140°00.0	10.5	-6°00.9	-12.5	59.0
14	26°39.5	-9°48.1	154°29.6	10.5	-6°13.3	-12.4	58.9
15	41°39.6	-9°47.2	168°59.1	10.5	-6°25.7	-12.4	58.9
16	56°39.7	-9°46.3	183°28.6	10.6	-6°38.0	-12.3	58.9
17	71°39.8	-9°45.3	197°58.2	10.6	-6°50.3	-12.3	58.8
18	86°39.9	-9°44.4	212°27.8	10.6	-7°02.6	-12.2	58.8
19	101°40.0	-9°43.5	226°57.4	10.6	-7°14.7	-12.1	58.7
20	116°40.1	-9°42.6	241°27.0	10.6	-7°26.8	-12.1	58.7
21	131°40.1	-9°41.7	255°56.7	10.7	-7°38.9	-12.0	58.7
22	146°40.2	-9°40.8	270°26.4	10.7	-7°50.9	-12.0	58.6
23	161°40.3	-9°39.8	284°56.0	10.7	-8°02.8	-11.9	58.6
	SD.=16.2	d=0.9			S.D.=16.2		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:45	07:03	08:16	16:13	17:26	18:45
70	05:46	06:57	08:02	16:27	17:32	18:43
68	05:47	06:52	07:50	16:39	17:37	18:42
66	05:48	06:47	07:40	16:48	17:41	18:41
64	05:48	06:43	07:32	16:56	17:45	18:40
62	05:49	06:40	07:26	17:03	17:48	18:40
60	05:49	06:37	07:20	17:09	17:51	18:40
58	05:49	06:34	07:14	17:14	17:54	18:40
56	05:49	06:32	07:10	17:18	17:56	18:40
54	05:48	06:29	07:05	17:23	17:59	18:40
52	05:48	06:27	07:02	17:26	18:01	18:40
50	05:48	06:25	06:58	17:30	18:03	18:40
45	05:47	06:21	06:50	17:37	18:07	18:41
40	05:45	06:17	06:44	17:44	18:11	18:42
35	05:43	06:13	06:39	17:49	18:15	18:44
30	05:42	06:09	06:34	17:54	18:18	18:46
20	05:37	06:03	06:25	18:02	18:25	18:50
10	05:31	05:56	06:17	18:10	18:31	18:56
0	05:25	05:49	06:10	18:17	18:38	19:02
-10	05:16	05:41	06:03	18:24	18:45	19:10
-20	05:06	05:32	05:55	18:32	18:54	19:21
-30	04:52	05:21	05:46	18:41	19:06	19:35
-35	04:43	05:14	05:40	18:46	19:12	19:43
-40	04:32	05:06	05:34	18:52	19:20	19:54
-45	04:19	04:56	05:27	18:59	19:30	20:07
-50	04:01	04:44	05:18	19:08	19:42	20:24
-52	03:53	04:38	05:14	19:12	19:48	20:33
-54	03:43	04:31	05:10	19:16	19:54	20:42
-56	03:32	04:24	05:05	19:21	20:01	20:53
-58	03:19	04:16	04:59	19:26	20:09	21:06
-60	03:03	04:06	04:53	19:32	20:19	21:21

		Moonrise			**Moonset**	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	19:38	21:45	23:49	08:57	08:41	08:25
70	19:42	21:41	23:36	08:50	08:41	08:33
68	19:46	21:37	23:26	08:44	08:41	08:38
66	19:49	21:34	23:17	08:39	08:41	08:43
64	19:51	21:32	23:10	08:35	08:41	08:48
62	19:53	21:30	23:03	08:31	08:41	08:51
60	19:55	21:28	22:58	08:28	08:41	08:54
58	19:57	21:27	22:53	08:25	08:41	08:57
56	19:58	21:25	22:49	08:22	08:41	08:60
54	19:59	21:24	22:45	08:20	08:41	09:02
52	20:01	21:23	22:42	08:17	08:41	09:04
50	20:02	21:22	22:39	08:15	08:41	09:06
45	20:04	21:19	22:32	08:11	08:41	09:10
40	20:06	21:18	22:27	08:07	08:41	09:14
35	20:08	21:16	22:22	08:04	08:41	09:17
30	20:09	21:15	22:18	08:01	08:41	09:20
20	20:12	21:12	22:11	07:56	08:41	09:24
10	20:14	21:10	22:05	07:52	08:41	09:28
0	20:16	21:08	21:59	07:48	08:41	09:32
-10	20:18	21:06	21:53	07:44	08:41	09:36
-20	20:21	21:04	21:47	07:39	08:41	09:40
-30	20:23	21:02	21:40	07:34	08:41	09:45
-35	20:25	21:01	21:36	07:31	08:40	09:48
-40	20:26	20:59	21:32	07:27	08:40	09:51
-45	20:28	20:58	21:27	07:23	08:40	09:54
-50	20:31	20:56	21:21	07:18	08:40	09:59
-52	20:32	20:55	21:18	07:16	08:40	10:01
-54	20:33	20:54	21:15	07:14	08:40	10:03
-56	20:34	20:53	21:11	07:11	08:40	10:05
-58	20:36	20:52	21:08	07:08	08:39	10:08
-60	20:37	20:50	21:04	07:04	08:39	10:11

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	13:41	13:38	12:13	01:34	14:02	17(95%)
22	13:34	13:30	12:13	02:28	14:54	18(88%)
23	13:27	13:22	12:13	03:20	15:45	19(80%)

February 24, 25 ,26 (Sun., Mon., Tue.)

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	153°34.9	218°40.4	-20°17.0	119°40.1	14°13.9	253°03.0	-22°31.6	224°53.9	-21°53.3
1	168°37.4	233°39.7	-20°16.7	134°41.0	14°14.5	268°05.1	-22°31.6	239°56.1	-21°53.2
2	183°39.8	248°39.1	-20°16.3	149°41.8	14°15.0	283°07.2	-22°31.6	254°58.3	-21°53.2
3	198°42.3	263°38.4	-20°16.0	164°42.6	14°15.6	298°09.3	-22°31.6	270°00.5	-21°53.2
4	213°44.8	278°37.8	-20°15.7	179°43.5	14°16.2	313°11.5	-22°31.7	285°02.7	-21°53.1
5	228°47.2	293°37.1	-20°15.3	194°44.3	14°16.8	328°13.6	-22°31.7	300°05.0	-21°53.1
6	243°49.7	308°36.5	-20°15.0	209°45.1	14°17.4	343°15.7	-22°31.7	315°07.2	-21°53.1
7	258°52.2	323°35.8	-20°14.7	224°46.0	14°17.9	358°17.8	-22°31.7	330°09.4	-21°53.1
8	273°54.6	338°35.2	-20°14.3	239°46.8	14°18.5	13°19.9	-22°31.7	345°11.6	-21°53.0
9	288°57.1	353°34.5	-20°14.0	254°47.6	14°19.1	28°22.1	-22°31.8	0°13.8	-21°53.0
10	303°59.5	8°33.8	-20°13.6	269°48.5	14°19.7	43°24.2	-22°31.8	15°16.1	-21°53.0
11	319°02.0	23°33.2	-20°13.3	284°49.3	14°20.3	58°26.3	-22°31.8	30°18.3	-21°53.0
12	334°04.5	38°32.5	-20°12.9	299°50.1	14°20.8	73°28.4	-22°31.8	45°20.5	-21°52.9
13	349°06.9	53°31.9	-20°12.6	314°51.0	14°21.4	88°30.5	-22°31.8	60°22.7	-21°52.9
14	4°09.4	68°31.2	-20°12.3	329°51.8	14°22.0	103°32.7	-22°31.9	75°24.9	-21°52.9
15	19°11.9	83°30.6	-20°11.9	344°52.6	14°22.6	118°34.8	-22°31.9	90°27.2	-21°52.8
16	34°14.3	98°29.9	-20°11.6	359°53.5	14°23.2	133°36.9	-22°31.9	105°29.4	-21°52.8
17	49°16.8	113°29.3	-20°11.2	14°54.3	14°23.7	148°39.0	-22°31.9	120°31.6	-21°52.8
18	64°19.3	128°28.6	-20°10.9	29°55.1	14°24.3	163°41.1	-22°31.9	135°33.8	-21°52.8
19	79°21.7	143°28.0	-20°10.5	44°56.0	14°24.9	178°43.3	-22°32.0	150°36.0	-21°52.7
20	94°24.2	158°27.3	-20°10.2	59°56.8	14°25.5	193°45.4	-22°32.0	165°38.3	-21°52.7
21	109°26.6	173°26.6	-20°09.8	74°57.6	14°26.1	208°47.5	-22°32.0	180°40.5	-21°52.7
22	124°29.1	188°26.0	-20°09.5	89°58.5	14°26.6	223°49.6	-22°32.0	195°42.7	-21°52.7
23	139°31.6	203°25.3	-20°09.1	104°59.3	14°27.2	238°51.8	-22°32.0	210°44.9	-21°52.6
Mer.pass.:13:43		v-0.7 d0.3 m-4.0		v0.8 d0.6 m1.1		v2.1 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	154°34.0	218°24.7	-20°08.8	120°00.1	14°27.8	253°53.9	-22°32.1	225°47.1	-21°52.6
1	169°36.5	233°24.0	-20°08.4	135°01.0	14°28.4	268°56.0	-22°32.1	240°49.4	-21°52.6
2	184°39.0	248°23.4	-20°08.0	150°01.8	14°28.9	283°58.1	-22°32.1	255°51.6	-21°52.5
3	199°41.4	263°22.7	-20°07.7	165°02.6	14°29.5	299°00.3	-22°32.1	270°53.8	-21°52.5
4	214°43.9	278°22.1	-20°07.3	180°03.4	14°30.1	314°02.4	-22°32.1	285°56.0	-21°52.5
5	229°46.4	293°21.4	-20°07.0	195°04.3	14°30.7	329°04.5	-22°32.2	300°58.2	-21°52.5
6	244°48.8	308°20.8	-20°06.6	210°05.1	14°31.3	344°06.6	-22°32.2	316°00.5	-21°52.4
7	259°51.3	323°20.1	-20°06.2	225°05.9	14°31.8	359°08.8	-22°32.2	331°02.7	-21°52.4
8	274°53.8	338°19.4	-20°05.9	240°06.8	14°32.4	14°10.9	-22°32.2	346°04.9	-21°52.4
9	289°56.2	353°18.8	-20°05.5	255°07.6	14°33.0	29°13.0	-22°32.2	1°07.1	-21°52.4
10	304°58.7	8°18.1	-20°05.2	270°08.4	14°33.6	44°15.1	-22°32.2	16°09.4	-21°52.3
11	320°01.1	23°17.5	-20°04.8	285°09.3	14°34.1	59°17.3	-22°32.3	31°11.6	-21°52.3
12	335°03.6	38°16.8	-20°04.4	300°10.1	14°34.7	74°19.4	-22°32.3	46°13.8	-21°52.3
13	350°06.1	53°16.2	-20°04.1	315°10.9	14°35.3	89°21.5	-22°32.3	61°16.0	-21°52.2
14	5°08.5	68°15.5	-20°03.7	330°11.8	14°35.9	104°23.6	-22°32.3	76°18.2	-21°52.2
15	20°11.0	83°14.9	-20°03.3	345°12.6	14°36.4	119°25.8	-22°32.3	91°20.5	-21°52.2
16	35°13.5	98°14.2	-20°02.9	0°13.4	14°37.0	134°27.9	-22°32.4	106°22.7	-21°52.2
17	50°15.9	113°13.6	-20°02.6	15°14.2	14°37.6	149°30.0	-22°32.4	121°24.9	-21°52.1
18	65°18.4	128°12.9	-20°02.2	30°15.1	14°38.2	164°32.2	-22°32.4	136°27.1	-21°52.1
19	80°20.9	143°12.3	-20°01.8	45°15.9	14°38.7	179°34.3	-22°32.4	151°29.4	-21°52.1
20	95°23.3	158°11.6	-20°01.5	60°16.7	14°39.3	194°36.4	-22°32.4	166°31.6	-21°52.1
21	110°25.8	173°11.0	-20°01.1	75°17.6	14°39.9	209°38.5	-22°32.5	181°33.8	-21°52.0
22	125°28.3	188°10.3	-20°00.7	90°18.4	14°40.5	224°40.7	-22°32.5	196°36.0	-21°52.0
23	140°30.7	203°09.7	-20°00.3	105°19.2	14°41.0	239°42.8	-22°32.5	211°38.3	-21°52.0
Mer.pass.:13:39		v-0.7 d0.4 m-4.0		v0.8 d0.6 m1.1		v2.1 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	155°33.2	218°09.0	-19°59.9	120°20.0	14°41.6	254°44.9	-22°32.5	226°40.5	-21°51.9
1	170°35.6	233°08.4	-19°59.6	135°20.9	14°42.2	269°47.1	-22°32.5	241°42.7	-21°51.9
2	185°38.1	248°07.7	-19°59.2	150°21.7	14°42.7	284°49.2	-22°32.6	256°44.9	-21°51.9
3	200°40.6	263°07.1	-19°58.8	165°22.5	14°43.3	299°51.3	-22°32.6	271°47.2	-21°51.9
4	215°43.0	278°06.4	-19°58.4	180°23.4	14°43.9	314°53.5	-22°32.6	286°49.4	-21°51.8
5	230°45.5	293°05.7	-19°58.0	195°24.2	14°44.5	329°55.6	-22°32.6	301°51.6	-21°51.8
6	245°48.0	308°05.1	-19°57.7	210°25.0	14°45.0	344°57.7	-22°32.6	316°53.8	-21°51.8
7	260°50.4	323°04.4	-19°57.3	225°25.8	14°45.6	359°59.8	-22°32.7	331°56.0	-21°51.8
8	275°52.9	338°03.8	-19°56.9	240°26.7	14°46.2	15°02.0	-22°32.7	346°58.3	-21°51.7
9	290°55.4	353°03.1	-19°56.5	255°27.5	14°46.7	30°04.1	-22°32.7	2°00.5	-21°51.7
10	305°57.8	8°02.5	-19°56.1	270°28.3	14°47.3	45°06.2	-22°32.7	17°02.7	-21°51.7
11	321°00.3	23°01.8	-19°55.7	285°29.2	14°47.9	60°08.4	-22°32.7	32°04.9	-21°51.6
12	336°02.7	38°01.2	-19°55.3	300°30.0	14°48.5	75°10.5	-22°32.7	47°07.2	-21°51.6
13	351°05.2	53°00.5	-19°54.9	315°30.8	14°49.0	90°12.6	-22°32.8	62°09.4	-21°51.6
14	6°07.7	67°59.9	-19°54.5	330°31.6	14°49.6	105°14.8	-22°32.8	77°11.6	-21°51.6
15	21°10.1	82°59.2	-19°54.1	345°32.5	14°50.2	120°16.9	-22°32.8	92°13.9	-21°51.5
16	36°12.6	97°58.6	-19°53.8	0°33.3	14°50.7	135°19.0	-22°32.8	107°16.1	-21°51.5
17	51°15.1	112°57.9	-19°53.4	15°34.1	14°51.3	150°21.2	-22°32.8	122°18.3	-21°51.5
18	66°17.5	127°57.3	-19°53.0	30°34.9	14°51.9	165°23.3	-22°32.9	137°20.5	-21°51.5
19	81°20.0	142°56.6	-19°52.6	45°35.8	14°52.4	180°25.4	-22°32.9	152°22.8	-21°51.4
20	96°22.5	157°56.0	-19°52.2	60°36.6	14°53.0	195°27.6	-22°32.9	167°25.0	-21°51.4
21	111°24.9	172°55.3	-19°51.8	75°37.4	14°53.6	210°29.7	-22°32.9	182°27.2	-21°51.4
22	126°27.4	187°54.7	-19°51.4	90°38.3	14°54.2	225°31.9	-22°32.9	197°29.4	-21°51.3
23	141°29.9	202°54.0	-19°51.0	105°39.1	14°54.7	240°34.0	-22°32.9	212°31.7	-21°51.3
Mer.pass.:13:35		v-0.7 d0.4 m-4.0		v0.8 d0.6 m1.2		v2.1 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars	SHA	Dec
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.2	-42°12.4
Schedar	349°36.5	56°38.5
Diphda	348°52.1	-17°53.2
Achernar	335°24.2	-57°08.8
Hamal	327°56.6	23°33.0
Polaris	316°13.4	89°20.9
Akamar	315°15.5	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°34.9	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.6	46°01.1
Bellatrix	278°27.7	6°21.8
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.1	-52°42.7
Sirius	258°30.0	-16°44.7
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.9	-59°34.5
Suhail	222°49.2	-43°30.7
Miaplacidus	221°38.0	-69°47.9
Alphard	217°52.0	-8°44.6
Regulus	207°39.0	11°52.3
Dubhe	193°46.3	61°38.8
Denebola	182°29.3	14°27.9
Gienah	175°48.0	-17°38.9
Acrux	173°04.4	-63°12.1
Gacrux	171°56.1	-57°13.0
Alioth	166°16.9	55°51.2
Spica	158°26.9	-11°15.6
Alcaid	152°55.5	49°12.9
Hadar	148°42.0	-60°27.6
Menkent	148°02.8	-36°27.6
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.2	-60°54.5
Zubenelg.	137°01.0	-16°07.1
Kochab	137°19.7	74°04.4
Alphecca	126°07.7	26°38.9
Antares	112°21.5	-26°28.3
Atria	107°19.9	-69°03.3
Sabik	102°08.2	-15°44.8
Shaula	96°16.8	-37°06.8
Rasalhague	96°03.0	12°32.8
Etamin	90°44.6	51°29.0
Kaus Aust.	83°38.9	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°53.7	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.6	-56°40.3
Deneb	49°29.3	45°20.8
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.2
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/2/2	SHA	Mer.pass
Venus	65°05.5	09:26
Mars	326°05.2	16:00
Jupiter	99°28.1	07:07
Saturn	71°19.0	08:59

2019/2/2	SHA	Mer.pass
Venus	63°50.6	09:27
Mars	325°26.1	15:59
Jupiter	99°19.8	07:03
Saturn	71°13.1	08:56

2019/2/2	SHA	Mer.pass
Venus	62°35.8	09:28
Mars	324°46.9	15:58
Jupiter	99°11.8	07:00
Saturn	71°07.3	08:52

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°40.4	-9°38.9	299°25.7	10.7	-8°14.7	-11.8	58.5
1	191°40.5	-9°38.0	313°55.5	10.7	-8°26.5	-11.8	58.5
2	206°40.6	-9°37.1	328°25.2	10.7	-8°38.3	-11.7	58.4
3	221°40.7	-9°36.1	342°54.9	10.7	-8°50.0	-11.7	58.4
4	236°40.8	-9°35.2	357°24.7	10.8	-9°01.6	-11.6	58.4
5	251°40.9	-9°34.3	11°54.5	10.8	-9°13.2	-11.5	58.3
6	266°40.9	-9°33.4	26°24.2	10.8	-9°24.7	-11.5	58.3
7	281°41.0	-9°32.5	40°54.0	10.8	-9°36.1	-11.4	58.2
8	296°41.1	-9°31.5	55°23.8	10.8	-9°47.4	-11.3	58.2
9	311°41.2	-9°30.6	69°53.6	10.8	-9°58.7	-11.3	58.2
10	326°41.3	-9°29.7	84°23.5	10.8	-10°10.0	-11.2	58.1
11	341°41.4	-9°28.8	98°53.3	10.8	-10°21.1	-11.1	58.1
12	356°41.5	-9°27.8	113°23.2	10.8	-10°32.2	-11.0	58.0
13	11°41.6	-9°26.9	127°53.0	10.9	-10°43.2	-11.0	58.0
14	26°41.7	-9°26.0	142°22.9	10.9	-10°54.1	-10.9	58.0
15	41°41.8	-9°25.1	156°52.7	10.9	-11°05.0	-10.8	57.9
16	56°41.9	-9°24.2	171°22.6	10.9	-11°15.8	-10.8	57.9
17	71°42.0	-9°23.2	185°52.5	10.9	-11°26.5	-10.7	57.8
18	86°42.1	-9°22.3	200°22.4	10.9	-11°37.2	-10.6	57.8
19	101°42.1	-9°21.4	214°52.3	10.9	-11°47.7	-10.5	57.8
20	116°42.2	-9°20.5	229°22.2	10.9	-11°58.2	-10.4	57.7
21	131°42.3	-9°19.5	243°52.1	10.9	-12°08.6	-10.4	57.7
22	146°42.4	-9°18.6	258°22.0	10.9	-12°19.0	-10.3	57.6
23	161°42.5	-9°17.7	272°51.9	10.9	-12°29.2	-10.2	57.6
	SD.=16.2	d=0.9			S.D.=16.0		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°42.6	-9°16.7	287°21.8	10.9	-12°39.4	-10.1	57.6
1	191°42.7	-9°15.8	301°51.7	10.9	-12°49.5	-10.1	57.5
2	206°42.8	-9°14.9	316°21.7	10.9	-12°59.5	-10.0	57.5
3	221°42.9	-9°14.0	330°51.6	10.9	-13°09.4	-9.9	57.4
4	236°43.0	-9°13.0	345°21.5	10.9	-13°19.3	-9.8	57.4
5	251°43.1	-9°12.1	359°51.4	10.9	-13°29.0	-9.7	57.4
6	266°43.2	-9°11.2	14°21.4	10.9	-13°38.7	-9.6	57.3
7	281°43.3	-9°10.3	28°51.3	10.9	-13°48.3	-9.6	57.3
8	296°43.4	-9°09.3	43°21.2	10.9	-13°57.8	-9.5	57.2
9	311°43.5	-9°08.4	57°51.2	10.9	-14°07.3	-9.4	57.2
10	326°43.6	-9°07.5	72°21.1	10.9	-14°16.6	-9.3	57.2
11	341°43.7	-9°06.5	86°51.0	10.9	-14°25.9	-9.2	57.1
12	356°43.8	-9°05.6	101°21.0	10.9	-14°35.0	-9.1	57.1
13	11°43.9	-9°04.7	115°50.9	10.9	-14°44.1	-9.0	57.1
14	26°44.0	-9°03.8	130°20.8	10.9	-14°53.1	-9.0	57.0
15	41°44.1	-9°02.8	144°50.8	10.9	-15°02.0	-8.9	57.0
16	56°44.2	-9°01.9	159°20.7	10.9	-15°10.8	-8.8	56.9
17	71°44.3	-9°01.0	173°50.6	10.9	-15°19.6	-8.7	56.9
18	86°44.4	-9°00.0	188°20.6	10.9	-15°28.2	-8.6	56.9
19	101°44.5	-8°59.1	202°50.5	10.9	-15°36.8	-8.5	56.8
20	116°44.6	-8°58.2	217°20.4	10.9	-15°45.2	-8.4	56.8
21	131°44.7	-8°57.2	231°50.3	10.9	-15°53.6	-8.3	56.8
22	146°44.8	-8°56.3	246°20.2	10.9	-16°01.9	-8.2	56.7
23	161°44.9	-8°55.4	260°50.2	10.9	-16°10.0	-8.1	56.7
	SD.=16.2	d=0.9			S.D.=15.7		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°45.0	-8°54.4	275°20.1	10.9	-16°18.1	-8.0	56.6
1	191°45.1	-8°53.5	289°50.0	10.9	-16°26.1	-7.9	56.6
2	206°45.2	-8°52.6	304°19.9	10.9	-16°34.0	-7.9	56.6
3	221°45.3	-8°51.6	318°49.8	10.9	-16°41.8	-7.8	56.5
4	236°45.4	-8°50.7	333°19.7	10.9	-16°49.5	-7.7	56.5
5	251°45.5	-8°49.8	347°49.6	10.9	-16°57.2	-7.6	56.5
6	266°45.6	-8°48.8	2°19.5	10.9	-17°04.7	-7.5	56.4
7	281°45.7	-8°47.9	16°49.4	10.9	-17°12.1	-7.4	56.4
8	296°45.8	-8°47.0	31°19.3	10.9	-17°19.4	-7.3	56.4
9	311°45.9	-8°46.0	45°49.2	10.9	-17°26.7	-7.2	56.3
10	326°46.0	-8°45.1	60°19.0	10.9	-17°33.8	-7.1	56.3
11	341°46.1	-8°44.2	74°48.9	10.9	-17°40.8	-7.0	56.3
12	356°46.2	-8°43.2	89°18.8	10.9	-17°47.8	-6.9	56.2
13	11°46.3	-8°42.3	103°48.7	10.9	-17°54.6	-6.8	56.2
14	26°46.4	-8°41.4	118°18.5	10.9	-18°01.4	-6.7	56.2
15	41°46.5	-8°40.4	132°48.4	10.9	-18°08.0	-6.6	56.1
16	56°46.6	-8°39.5	147°18.3	10.9	-18°14.6	-6.5	56.1
17	71°46.7	-8°38.6	161°48.1	10.9	-18°21.0	-6.4	56.1
18	86°46.8	-8°37.6	176°18.0	10.9	-18°27.4	-6.3	56.0
19	101°46.9	-8°36.7	190°47.8	10.9	-18°33.6	-6.2	56.0
20	116°47.0	-8°35.8	205°17.7	10.9	-18°39.8	-6.1	56.0
21	131°47.1	-8°34.8	219°47.5	10.8	-18°45.8	-6.0	55.9
22	146°47.3	-8°33.9	234°17.4	10.8	-18°51.7	-5.9	55.9
23	161°47.4	-8°32.9	248°47.2	10.8	-18°57.6	-5.8	55.9
	SD.=16.2	d=0.9			S.D.=15.5		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:31	06:49	07:60	16:28	17:40	18:58
70	05:34	06:44	07:47	16:40	17:44	18:55
68	05:36	06:40	07:37	16:50	17:48	18:52
66	05:38	06:37	07:29	16:58	17:51	18:50
64	05:39	06:34	07:22	17:05	17:54	18:49
62	05:40	06:31	07:16	17:11	17:56	18:48
60	05:41	06:29	07:11	17:16	17:59	18:47
58	05:41	06:27	07:06	17:21	18:01	18:46
56	05:42	06:25	07:02	17:25	18:03	18:46
54	05:42	06:23	06:59	17:28	18:04	18:45
52	05:42	06:21	06:55	17:32	18:06	18:45
50	05:42	06:20	06:52	17:35	18:08	18:45
45	05:42	06:16	06:45	17:41	18:11	18:45
40	05:41	06:13	06:40	17:47	18:14	18:46
35	05:40	06:09	06:35	17:52	18:17	18:47
30	05:39	06:07	06:31	17:56	18:20	18:48
20	05:35	06:01	06:23	18:03	18:26	18:51
10	05:30	05:55	06:16	18:10	18:31	18:56
0	05:24	05:49	06:10	18:16	18:37	19:02
-10	05:17	05:42	06:03	18:23	18:44	19:09
-20	05:07	05:34	05:56	18:30	18:52	19:18
-30	04:54	05:23	05:48	18:38	19:02	19:31
-35	04:46	05:17	05:43	18:43	19:09	19:39
-40	04:36	05:09	05:37	18:48	19:16	19:49
-45	04:24	05:00	05:31	18:54	19:25	20:01
-50	04:08	04:49	05:23	19:02	19:36	20:17
-52	03:60	04:44	05:20	19:05	19:41	20:25
-54	03:51	04:38	05:16	19:09	19:47	20:33
-56	03:41	04:31	05:11	19:13	19:53	20:43
-58	03:29	04:24	05:06	19:18	20:01	20:55
-60	03:15	04:15	05:01	19:24	20:09	21:09

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	01:58	04:29	08:08	07:45	06:58
70	–:–	01:32	03:32	08:23	08:12	07:56
68	–:–	01:12	02:58	08:36	08:33	08:31
66	–:–	00:57	02:34	08:46	08:49	08:55
64	–:–	00:44	02:15	08:54	09:03	09:15
62	–:–	00:34	02:00	09:02	09:15	09:31
60	–:–	00:25	01:47	09:08	09:24	09:44
58	–:–	00:17	01:36	09:14	09:33	09:56
56	–:–	00:10	01:27	09:19	09:41	10:06
54	–:–	00:04	01:18	09:24	09:47	10:15
52	23:58	–:–	01:11	09:28	09:54	10:23
50	23:53	–:–	01:04	09:32	09:59	10:30
45	23:42	–:–	00:50	09:40	10:11	10:45
40	23:34	–:–	00:38	09:47	10:21	10:58
35	23:26	–:–	00:28	09:53	10:30	11:09
30	23:19	–:–	00:19	09:58	10:37	11:18
20	23:08	–:–	00:04	10:07	10:50	11:35
10	22:58	23:51	–:–	10:15	11:02	11:49
0	22:49	23:38	–:–	10:23	11:12	12:02
-10	22:39	23:26	–:–	10:30	11:23	12:16
-20	22:30	23:13	23:58	10:38	11:35	12:30
-30	22:19	22:59	23:41	10:48	11:48	12:47
-35	22:12	22:50	23:31	10:53	11:56	12:56
-40	22:05	22:41	23:19	10:59	12:05	13:07
-45	21:57	22:29	23:05	11:06	12:15	13:20
-50	21:47	22:16	22:49	11:15	12:27	13:36
-52	21:42	22:09	22:41	11:19	12:33	13:44
-54	21:37	22:02	22:32	11:23	12:40	13:52
-56	21:32	21:55	22:23	11:28	12:47	14:01
-58	21:25	21:46	22:12	11:33	12:55	14:12
-60	21:18	21:36	21:59	11:39	13:04	14:24

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	13:18	13:14	12:13	04:10	16:35	20(70%)
25	13:09	13:05	12:13	05:00	17:25	21(60%)
26	13:00	12:55	12:12	05:50	18:15	22(50%)

February 27, 28 ,01 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	156°32.3	217°53.4	-19°50.6	120°39.9	14°55.3	255°36.1	-22°33.0	227°33.9	-21°51.3
1	171°34.8	232°52.8	-19°50.2	135°40.7	14°55.9	270°38.3	-22°33.0	242°36.1	-21°51.3
2	186°37.2	247°52.1	-19°49.8	150°41.6	14°56.4	285°40.4	-22°33.0	257°38.3	-21°51.2
3	201°39.7	262°51.5	-19°49.3	165°42.4	14°57.0	300°42.5	-22°33.0	272°40.6	-21°51.2
4	216°42.2	277°50.8	-19°48.9	180°43.2	14°57.6	315°44.7	-22°33.0	287°42.8	-21°51.2
5	231°44.6	292°50.2	-19°48.5	195°44.0	14°58.1	330°46.8	-22°33.1	302°45.0	-21°51.2
6	246°47.1	307°49.5	-19°48.1	210°44.9	14°58.7	345°48.9	-22°33.1	317°47.2	-21°51.1
7	261°49.6	322°48.9	-19°47.7	225°45.7	14°59.3	0°51.1	-22°33.1	332°49.5	-21°51.1
8	276°52.0	337°48.2	-19°47.3	240°46.5	14°59.8	15°53.2	-22°33.1	347°51.7	-21°51.1
9	291°54.5	352°47.6	-19°46.9	255°47.3	15°00.4	30°55.4	-22°33.1	2°53.9	-21°51.1
10	306°57.0	7°46.9	-19°46.5	270°48.2	15°01.0	45°57.5	-22°33.2	17°56.2	-21°51.0
11	321°59.4	22°46.3	-19°46.1	285°49.0	15°01.5	60°59.6	-22°33.2	32°58.4	-21°51.0
12	337°01.9	37°45.6	-19°45.7	300°49.8	15°02.1	76°01.8	-22°33.2	48°00.6	-21°51.0
13	352°04.4	52°45.0	-19°45.2	315°50.6	15°02.7	91°03.9	-22°33.2	63°02.8	-21°50.9
14	7°06.8	67°44.3	-19°44.8	330°51.5	15°03.2	106°06.1	-22°33.2	78°05.1	-21°50.9
15	22°09.3	82°43.7	-19°44.4	345°52.3	15°03.8	121°08.2	-22°33.2	93°07.3	-21°50.9
16	37°11.7	97°43.0	-19°44.0	0°53.1	15°04.3	136°10.3	-22°33.3	108°09.5	-21°50.9
17	52°14.2	112°42.4	-19°43.6	15°53.9	15°04.9	151°12.5	-22°33.3	123°11.8	-21°50.8
18	67°16.7	127°41.7	-19°43.2	30°54.7	15°05.5	166°14.6	-22°33.3	138°14.0	-21°50.8
19	82°19.1	142°41.1	-19°42.7	45°55.6	15°06.0	181°16.8	-22°33.3	153°16.2	-21°50.8
20	97°21.6	157°40.5	-19°42.3	60°56.4	15°06.6	196°18.9	-22°33.3	168°18.4	-21°50.8
21	112°24.1	172°39.8	-19°41.9	75°57.2	15°07.2	211°21.0	-22°33.3	183°20.7	-21°50.7
22	127°26.5	187°39.2	-19°41.5	90°58.0	15°07.7	226°23.2	-22°33.4	198°22.9	-21°50.7
23	142°29.0	202°38.5	-19°41.0	105°58.9	15°08.3	241°25.3	-22°33.4	213°25.1	-21°50.7
Mer.pass.:13:31		v-0.6 d0.4 m-4.0		v0.8 d0.6 m1.2		v2.1 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	157°31.5	217°37.9	-19°40.6	120°59.7	15°08.9	256°27.5	-22°33.4	228°27.4	-21°50.7
1	172°33.9	232°37.2	-19°40.2	136°00.5	15°09.4	271°29.6	-22°33.4	243°29.6	-21°50.6
2	187°36.4	247°36.6	-19°39.8	151°01.3	15°10.0	286°31.8	-22°33.4	258°31.8	-21°50.6
3	202°38.9	262°35.9	-19°39.3	166°02.2	15°10.5	301°33.9	-22°33.5	273°34.0	-21°50.6
4	217°41.3	277°35.3	-19°38.9	181°03.0	15°11.1	316°36.0	-22°33.5	288°36.3	-21°50.5
5	232°43.8	292°34.6	-19°38.5	196°03.8	15°11.7	331°38.2	-22°33.5	303°38.5	-21°50.5
6	247°46.2	307°34.0	-19°38.0	211°04.6	15°12.2	346°40.3	-22°33.5	318°40.7	-21°50.5
7	262°48.7	322°33.4	-19°37.6	226°05.4	15°12.8	1°42.5	-22°33.5	333°43.0	-21°50.5
8	277°51.2	337°32.7	-19°37.2	241°06.3	15°13.3	16°44.6	-22°33.5	348°45.2	-21°50.4
9	292°53.6	352°32.1	-19°36.7	256°07.1	15°13.9	31°46.8	-22°33.6	3°47.4	-21°50.4
10	307°56.1	7°31.4	-19°36.3	271°07.9	15°14.5	46°48.9	-22°33.6	18°49.7	-21°50.4
11	322°58.6	22°30.8	-19°35.9	286°08.7	15°15.0	61°51.1	-22°33.6	33°51.9	-21°50.4
12	338°01.0	37°30.1	-19°35.4	301°09.6	15°15.6	76°53.2	-22°33.6	48°54.1	-21°50.3
13	353°03.5	52°29.5	-19°35.0	316°10.4	15°16.2	91°55.3	-22°33.6	63°56.4	-21°50.3
14	8°06.0	67°28.9	-19°34.6	331°11.2	15°16.7	106°57.5	-22°33.6	78°58.6	-21°50.3
15	23°08.4	82°28.2	-19°34.1	346°12.0	15°17.3	121°59.6	-22°33.7	94°00.8	-21°50.2
16	38°10.9	97°27.6	-19°33.7	1°12.8	15°17.8	137°01.8	-22°33.7	109°03.0	-21°50.2
17	53°13.3	112°26.9	-19°33.2	16°13.7	15°18.4	152°03.9	-22°33.7	124°05.3	-21°50.2
18	68°15.8	127°26.3	-19°32.8	31°14.5	15°18.9	167°06.1	-22°33.7	139°07.5	-21°50.2
19	83°18.3	142°25.6	-19°32.3	46°15.3	15°19.5	182°08.2	-22°33.7	154°09.7	-21°50.1
20	98°20.7	157°25.0	-19°31.9	61°16.1	15°20.1	197°10.4	-22°33.8	169°12.0	-21°50.1
21	113°23.2	172°24.4	-19°31.5	76°16.9	15°20.6	212°12.5	-22°33.8	184°14.2	-21°50.1
22	128°25.7	187°23.7	-19°31.0	91°17.8	15°21.2	227°14.7	-22°33.8	199°16.4	-21°50.1
23	143°28.1	202°23.1	-19°30.6	106°18.6	15°21.7	242°16.8	-22°33.8	214°18.7	-21°50.0
Mer.pass.:13:27		v-0.6 d0.4 m-4.0		v0.8 d0.6 m1.2		v2.1 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	158°30.6	217°22.4	-19°30.1	121°19.4	15°22.3	257°19.0	-22°33.8	229°20.9	-21°50.0
1	173°33.1	232°21.8	-19°29.7	136°20.2	15°22.9	272°21.1	-22°33.8	244°23.1	-21°50.0
2	188°35.5	247°21.1	-19°29.2	151°21.0	15°23.4	287°23.3	-22°33.9	259°25.4	-21°50.0
3	203°38.0	262°20.5	-19°28.8	166°21.9	15°24.0	302°25.4	-22°33.9	274°27.6	-21°49.9
4	218°40.5	277°19.9	-19°28.3	181°22.7	15°24.5	317°27.6	-22°33.9	289°29.8	-21°49.9
5	233°42.9	292°19.2	-19°27.9	196°23.5	15°25.1	332°29.7	-22°33.9	304°32.1	-21°49.9
6	248°45.4	307°18.6	-19°27.4	211°24.3	15°25.6	347°31.9	-22°33.9	319°34.3	-21°49.8
7	263°47.8	322°17.9	-19°26.9	226°25.1	15°26.2	2°34.0	-22°33.9	334°36.5	-21°49.8
8	278°50.3	337°17.3	-19°26.5	241°26.0	15°26.8	17°36.2	-22°34.0	349°38.8	-21°49.8
9	293°52.8	352°16.7	-19°26.0	256°26.8	15°27.3	32°38.3	-22°34.0	4°41.0	-21°49.8
10	308°55.2	7°16.0	-19°25.6	271°27.6	15°27.9	47°40.5	-22°34.0	19°43.2	-21°49.7
11	323°57.7	22°15.4	-19°25.1	286°28.4	15°28.4	62°42.6	-22°34.0	34°45.5	-21°49.7
12	339°00.2	37°14.7	-19°24.7	301°29.2	15°29.0	77°44.8	-22°34.0	49°47.7	-21°49.7
13	354°02.6	52°14.1	-19°24.2	316°30.1	15°29.5	92°46.9	-22°34.0	64°49.9	-21°49.7
14	9°05.1	67°13.5	-19°23.7	331°30.9	15°30.1	107°49.1	-22°34.1	79°52.2	-21°49.6
15	24°07.6	82°12.8	-19°23.3	346°31.7	15°30.6	122°51.2	-22°34.1	94°54.4	-21°49.6
16	39°10.0	97°12.2	-19°22.8	1°32.5	15°31.2	137°53.4	-22°34.1	109°56.6	-21°49.6
17	54°12.5	112°11.6	-19°22.3	16°33.3	15°31.7	152°55.5	-22°34.1	124°58.9	-21°49.6
18	69°15.0	127°10.9	-19°21.9	31°34.1	15°32.3	167°57.7	-22°34.1	140°01.1	-21°49.5
19	84°17.4	142°10.3	-19°21.4	46°35.0	15°32.9	182°59.9	-22°34.1	155°03.3	-21°49.5
20	99°19.9	157°09.6	-19°20.9	61°35.8	15°33.4	198°02.0	-22°34.2	170°05.6	-21°49.5
21	114°22.3	172°09.0	-19°20.5	76°36.6	15°34.0	213°04.2	-22°34.2	185°07.8	-21°49.5
22	129°24.8	187°08.4	-19°20.0	91°37.4	15°34.5	228°06.3	-22°34.2	200°10.0	-21°49.4
23	144°27.3	202°07.7	-19°19.5	106°38.2	15°35.1	243°08.5	-22°34.2	215°12.3	-21°49.4
Mer.pass.:13:23		v-0.6 d0.4 m-4.0		v0.8 d0.6 m1.2		v2.1 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.7
Ankaa	353°12.2	-42°12.4
Schedar	349°36.6	56°38.5
Diphda	348°52.1	-17°53.2
Achernar	335°24.3	-57°08.8
Hamal	327°56.6	23°33.0
Polaris	316°14.6	89°20.9
Akamar	315°15.5	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°34.9	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.2	-8°11.1
Capella	280°28.6	46°01.1
Bellatrix	278°27.7	6°21.8
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.2	-52°42.8
Sirius	258°30.0	-16°44.7
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.9	-59°34.5
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.0	-69°47.9
Alphard	217°52.0	-8°44.6
Regulus	207°39.0	11°52.3
Dubhe	193°46.3	61°38.8
Denebola	182°29.3	14°27.8
Gienah	175°48.0	-17°38.9
Acrux	173°04.4	-63°12.1
Gacrux	171°56.1	-57°13.0
Alioth	166°16.9	55°51.2
Spica	158°26.9	-11°15.6
Alcaid	152°55.5	49°12.9
Hadar	148°42.0	-60°27.6
Menkent	148°02.8	-36°27.6
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.1	-60°54.5
Zubenelg.	137°01.0	-16°07.1
Kochab	137°19.6	74°04.4
Alphecca	126°07.7	26°38.9
Antares	112°21.5	-26°28.3
Atria	107°19.9	-69°03.3
Sabik	102°08.1	-15°44.8
Shaula	96°16.8	-37°06.8
Rasalhague	96°03.0	12°32.8
Etamin	90°44.5	51°29.0
Kaus Aust.	83°38.8	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°53.7	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.6	-56°40.3
Deneb	49°29.2	45°20.8
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.2
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/2/2	**SHA**	**Mer.pass**
Venus	61°21.1	09:29
Mars	324°07.6	15:56
Jupiter	99°03.8	06:57
Saturn	71°01.6	08:48

2019/2/2	**SHA**	**Mer.pass**
Venus	60°06.4	09:30
Mars	323°28.2	15:55
Jupiter	98°56.0	06:53
Saturn	70°55.9	08:45

2019/3/1	**SHA**	**Mer.pass**
Venus	58°51.8	09:31
Mars	322°48.8	15:54
Jupiter	98°48.4	06:50
Saturn	70°50.3	08:41

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°47.5	-8°32.0	263°17.1	10.8	-19°03.3	-5.7	55.8
1	191°47.6	-8°31.1	277°46.9	10.8	-19°09.0	-5.6	55.8
2	206°47.7	-8°30.1	292°16.8	10.8	-19°14.5	-5.5	55.8
3	221°47.8	-8°29.2	306°46.6	10.8	-19°20.0	-5.4	55.8
4	236°47.9	-8°28.3	321°16.4	10.8	-19°25.3	-5.3	55.7
5	251°48.0	-8°27.3	335°46.3	10.8	-19°30.5	-5.2	55.7
6	266°48.1	-8°26.4	350°16.1	10.8	-19°35.6	-5.1	55.7
7	281°48.2	-8°25.4	4°45.9	10.8	-19°40.7	-5.0	55.6
8	296°48.3	-8°24.5	19°15.7	10.8	-19°45.6	-4.9	55.6
9	311°48.4	-8°23.6	33°45.6	10.8	-19°50.4	-4.8	55.6
10	326°48.5	-8°22.6	48°15.4	10.8	-19°55.1	-4.7	55.6
11	341°48.7	-8°21.7	62°45.2	10.8	-19°59.7	-4.6	55.5
12	356°48.8	-8°20.7	77°15.1	10.8	-20°04.2	-4.5	55.5
13	11°48.9	-8°19.8	91°44.9	10.8	-20°08.7	-4.4	55.5
14	26°49.0	-8°18.9	106°14.7	10.8	-20°12.9	-4.2	55.4
15	41°49.1	-8°17.9	120°44.6	10.8	-20°17.1	-4.1	55.4
16	56°49.2	-8°17.0	135°14.4	10.8	-20°21.2	-4.0	55.4
17	71°49.3	-8°16.0	149°44.2	10.8	-20°25.2	-3.9	55.4
18	86°49.4	-8°15.1	164°14.1	10.8	-20°29.1	-3.8	55.3
19	101°49.5	-8°14.2	178°43.9	10.8	-20°32.9	-3.7	55.3
20	116°49.6	-8°13.2	193°13.7	10.8	-20°36.5	-3.6	55.3
21	131°49.8	-8°12.3	207°43.6	10.8	-20°40.1	-3.5	55.3
22	146°49.9	-8°11.3	222°13.4	10.8	-20°43.6	-3.4	55.2
23	161°50.0	-8°10.4	236°43.3	10.9	-20°46.9	-3.3	55.2
	SD.=16.2	d=0.9			S.D.=15.2		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°50.1	-8°09.4	251°13.1	10.9	-20°50.2	-3.2	55.2
1	191°50.2	-8°08.5	265°43.0	10.9	-20°53.3	-3.1	55.2
2	206°50.3	-8°07.6	280°12.8	10.9	-20°56.3	-3.0	55.1
3	221°50.4	-8°06.6	294°42.7	10.9	-20°59.3	-2.9	55.1
4	236°50.5	-8°05.7	309°12.6	10.9	-21°02.1	-2.8	55.1
5	251°50.7	-8°04.7	323°42.5	10.9	-21°04.8	-2.7	55.1
6	266°50.8	-8°03.8	338°12.3	10.9	-21°07.4	-2.6	55.0
7	281°50.9	-8°02.8	352°42.2	10.9	-21°09.9	-2.5	55.0
8	296°51.0	-8°01.9	7°12.1	10.9	-21°12.3	-2.3	55.0
9	311°51.1	-8°01.0	21°42.0	10.9	-21°14.6	-2.2	55.0
10	326°51.2	-8°00.0	36°12.0	10.9	-21°16.8	-2.1	55.0
11	341°51.3	-7°59.1	50°41.9	10.9	-21°18.9	-2.0	54.9
12	356°51.4	-7°58.1	65°11.8	10.9	-21°20.9	-1.9	54.9
13	11°51.6	-7°57.2	79°41.8	10.9	-21°22.8	-1.8	54.9
14	26°51.7	-7°56.2	94°11.7	11.0	-21°24.5	-1.7	54.9
15	41°51.8	-7°55.3	108°41.7	11.0	-21°26.2	-1.6	54.8
16	56°51.9	-7°54.3	123°11.6	11.0	-21°27.8	-1.5	54.8
17	71°52.0	-7°53.4	137°41.6	11.0	-21°29.2	-1.4	54.8
18	86°52.1	-7°52.4	152°11.6	11.0	-21°30.5	-1.3	54.8
19	101°52.3	-7°51.5	166°41.6	11.0	-21°31.8	-1.2	54.8
20	116°52.4	-7°50.5	181°11.6	11.0	-21°32.9	-1.1	54.7
21	131°52.5	-7°49.6	195°41.6	11.0	-21°33.9	-1.0	54.7
22	146°52.6	-7°48.7	210°11.7	11.0	-21°34.9	-0.9	54.7
23	161°52.7	-7°47.7	224°41.7	11.1	-21°35.7	-0.8	54.7
	SD.=16.1	d=0.9			S.D.=15.1		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	176°52.8	-7°46.8	239°11.8	11.1	-21°36.4	-0.7	54.7
1	191°53.0	-7°45.8	253°41.9	11.1	-21°37.0	-0.6	54.7
2	206°53.1	-7°44.9	268°12.0	11.1	-21°37.5	-0.4	54.6
3	221°53.2	-7°43.9	282°42.1	11.1	-21°37.9	-0.3	54.6
4	236°53.3	-7°43.0	297°12.2	11.1	-21°38.2	-0.2	54.6
5	251°53.4	-7°42.0	311°42.4	11.2	-21°38.4	-0.1	54.6
6	266°53.5	-7°41.1	326°12.5	11.2	-21°38.5	-0.0	54.6
7	281°53.7	-7°40.1	340°42.7	11.2	-21°38.4	0.1	54.5
8	296°53.8	-7°39.2	355°12.9	11.2	-21°38.3	0.2	54.5
9	311°53.9	-7°38.2	9°43.1	11.2	-21°38.1	0.3	54.5
10	326°54.0	-7°37.3	24°13.4	11.2	-21°37.8	0.4	54.5
11	341°54.1	-7°36.3	38°43.6	11.3	-21°37.3	0.5	54.5
12	356°54.3	-7°35.4	53°13.9	11.3	-21°36.8	0.6	54.5
13	11°54.4	-7°34.4	67°44.2	11.3	-21°36.1	0.7	54.5
14	26°54.5	-7°33.5	82°14.5	11.3	-21°35.4	0.8	54.4
15	41°54.6	-7°32.5	96°44.8	11.3	-21°34.5	0.9	54.4
16	56°54.7	-7°31.6	111°15.2	11.4	-21°33.6	1.0	54.4
17	71°54.9	-7°30.6	125°45.5	11.4	-21°32.5	1.1	54.4
18	86°55.0	-7°29.7	140°15.9	11.4	-21°31.4	1.2	54.4
19	101°55.1	-7°28.7	154°46.3	11.4	-21°30.1	1.3	54.4
20	116°55.2	-7°27.8	169°16.8	11.5	-21°28.8	1.4	54.4
21	131°55.4	-7°26.8	183°47.2	11.5	-21°27.3	1.5	54.3
22	146°55.5	-7°25.9	198°17.7	11.5	-21°25.8	1.6	54.3
23	161°55.6	-7°24.9	212°48.2	11.5	-21°24.1	1.7	54.3
	SD.=16.1	d=0.9			S.D.=14.9		

	Twilight					Twilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:16	06:34	07:44	16:43	17:53	19:11
70	05:21	06:31	07:33	16:54	17:56	19:07
68	05:24	06:28	07:25	17:02	17:59	19:03
66	05:27	06:26	07:18	17:09	18:01	19:00
64	05:29	06:24	07:12	17:15	18:03	18:58
62	05:31	06:22	07:07	17:20	18:04	18:56
60	05:32	06:20	07:02	17:24	18:06	18:54
58	05:34	06:19	06:58	17:28	18:07	18:53
56	05:35	06:17	06:55	17:31	18:09	18:52
54	05:35	06:16	06:52	17:34	18:10	18:51
52	05:36	06:15	06:49	17:37	18:11	18:50
50	05:36	06:14	06:46	17:40	18:12	18:50
45	05:37	06:11	06:40	17:46	18:15	18:49
40	05:37	06:08	06:35	17:50	18:17	18:49
35	05:36	06:06	06:31	17:54	18:20	18:49
30	05:36	06:03	06:27	17:58	18:22	18:50
20	05:33	05:59	06:21	18:05	18:27	18:52
10	05:29	05:54	06:15	18:10	18:32	18:56
0	05:24	05:48	06:09	18:16	18:37	19:01
-10	05:17	05:42	06:03	18:22	18:43	19:07
-20	05:09	05:35	05:57	18:28	18:50	19:16
-30	04:57	05:26	05:50	18:35	18:59	19:28
-35	04:49	05:20	05:46	18:39	19:05	19:35
-40	04:40	05:13	05:41	18:44	19:11	19:44
-45	04:28	05:05	05:35	18:49	19:19	19:56
-50	04:14	04:55	05:28	18:56	19:29	20:10
-52	04:06	04:50	05:25	18:59	19:34	20:17
-54	03:58	04:45	05:22	19:02	19:39	20:25
-56	03:49	04:38	05:18	19:06	19:45	20:34
-58	03:38	04:32	05:14	19:10	19:52	20:45
-60	03:25	04:24	05:09	19:15	19:59	20:57

	Moonrise			Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	–:–	–:–	–:–	–:–
70	05:57	–:–	–:–	07:15	–:–	–:–
68	04:43	06:25	07:41	08:29	08:32	08:59
66	04:07	05:29	06:30	09:07	09:28	10:10
64	03:41	04:55	05:54	09:33	10:02	10:46
62	03:20	04:31	05:28	09:54	10:26	11:11
60	03:04	04:12	05:08	10:11	10:46	11:32
58	02:50	03:56	04:52	10:25	11:02	11:48
56	02:38	03:42	04:37	10:37	11:15	12:02
54	02:28	03:31	04:25	10:48	11:27	12:15
52	02:19	03:20	04:14	10:57	11:38	12:25
50	02:10	03:11	04:05	11:06	11:47	12:35
45	01:53	02:52	03:45	11:24	12:07	12:55
40	01:39	02:36	03:28	11:38	12:23	13:11
35	01:27	02:23	03:15	11:51	12:36	13:25
30	01:16	02:11	03:03	12:02	12:48	13:37
20	00:58	01:51	02:42	12:21	13:08	13:57
10	00:43	01:34	02:24	12:37	13:26	14:15
0	00:28	01:18	02:08	12:52	13:42	14:32
-10	00:14	01:02	01:51	13:08	13:59	14:48
-20	–:–	00:45	01:34	13:24	14:16	15:06
-30	–:–	00:26	01:13	13:43	14:36	15:26
-35	–:–	00:14	01:01	13:54	14:48	15:38
-40	–:–	00:01	00:48	14:07	15:02	15:52
-45	23:46	–:–	00:32	14:22	15:18	16:08
-50	23:27	–:–	00:12	14:40	15:37	16:28
-52	23:18	–:–	00:02	14:49	15:47	16:37
-54	23:08	23:52	–:–	14:58	15:57	16:47
-56	22:57	23:40	–:–	15:09	16:09	16:59
-58	22:44	23:26	–:–	15:22	16:23	17:13
-60	22:29	23:09	–:–	15:37	16:39	17:29

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	12:50	12:45	12:12	06:40	19:05	23(40%)
28	12:40	12:34	12:12	07:30	19:55	24(31%)
1	12:29	12:23	12:12	08:19	20:44	25(22%)

March 02, 03 ,04 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	159°29.7	217°07.1	-19°19.1	121°39.0	15°35.6	258°10.6	-22°34.2	230°14.5	-21°49.4
1	174°32.2	232°06.5	-19°18.6	136°39.9	15°36.2	273°12.8	-22°34.2	245°16.7	-21°49.3
2	189°34.7	247°05.8	-19°18.1	151°40.7	15°36.7	288°14.9	-22°34.3	260°19.0	-21°49.3
3	204°37.1	262°05.2	-19°17.6	166°41.5	15°37.3	303°17.1	-22°34.3	275°21.2	-21°49.3
4	219°39.6	277°04.5	-19°17.2	181°42.3	15°37.8	318°19.3	-22°34.3	290°23.5	-21°49.3
5	234°42.1	292°03.9	-19°16.7	196°43.1	15°38.4	333°21.4	-22°34.3	305°25.7	-21°49.2
6	249°44.5	307°03.3	-19°16.2	211°43.9	15°38.9	348°23.6	-22°34.3	320°27.9	-21°49.2
7	264°47.0	322°02.6	-19°15.7	226°44.8	15°39.5	3°25.7	-22°34.3	335°30.2	-21°49.2
8	279°49.5	337°02.0	-19°15.2	241°45.6	15°40.0	18°27.9	-22°34.4	350°32.4	-21°49.2
9	294°51.9	352°01.4	-19°14.8	256°46.4	15°40.6	33°30.0	-22°34.4	5°34.6	-21°49.1
10	309°54.4	7°00.7	-19°14.3	271°47.2	15°41.1	48°32.2	-22°34.4	20°36.9	-21°49.1
11	324°56.8	22°00.1	-19°13.8	286°48.0	15°41.7	63°34.4	-22°34.4	35°39.1	-21°49.1
12	339°59.3	36°59.5	-19°13.3	301°48.8	15°42.2	78°36.5	-22°34.4	50°41.3	-21°49.1
13	355°01.8	51°58.8	-19°12.8	316°49.7	15°42.8	93°38.7	-22°34.4	65°43.6	-21°49.0
14	10°04.2	66°58.2	-19°12.3	331°50.5	15°43.3	108°40.8	-22°34.5	80°45.8	-21°49.0
15	25°06.7	81°57.6	-19°11.9	346°51.3	15°43.9	123°43.0	-22°34.5	95°48.1	-21°49.0
16	40°09.2	96°56.9	-19°11.4	1°52.1	15°44.4	138°45.2	-22°34.5	110°50.3	-21°49.0
17	55°11.6	111°56.3	-19°10.9	16°52.9	15°45.0	153°47.3	-22°34.5	125°52.5	-21°48.9
18	70°14.1	126°55.7	-19°10.4	31°53.7	15°45.5	168°49.5	-22°34.5	140°54.8	-21°48.9
19	85°16.6	141°55.0	-19°09.9	46°54.5	15°46.1	183°51.6	-22°34.5	155°57.0	-21°48.9
20	100°19.0	156°54.4	-19°09.4	61°55.4	15°46.6	198°53.8	-22°34.6	170°59.2	-21°48.8
21	115°21.5	171°53.8	-19°08.9	76°56.2	15°47.2	213°56.0	-22°34.6	186°01.5	-21°48.8
22	130°23.9	186°53.1	-19°08.4	91°57.0	15°47.7	228°58.1	-22°34.6	201°03.7	-21°48.8
23	145°26.4	201°52.5	-19°07.9	106°57.8	15°48.3	244°00.3	-22°34.6	216°06.0	-21°48.8
Mer.pass.:13:19		v-0.6 d0.5 m-4.0		v0.8 d0.6 m1.2		v2.2 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	160°28.9	216°51.9	-19°07.4	121°58.6	15°48.8	259°02.4	-22°34.6	231°08.2	-21°48.7
1	175°31.3	231°51.2	-19°06.9	136°59.4	15°49.4	274°04.6	-22°34.6	246°10.4	-21°48.7
2	190°33.8	246°50.6	-19°06.4	152°00.2	15°49.9	289°06.8	-22°34.6	261°12.7	-21°48.7
3	205°36.3	261°50.0	-19°05.9	167°01.1	15°50.5	304°08.9	-22°34.7	276°14.9	-21°48.7
4	220°38.7	276°49.3	-19°05.5	182°01.9	15°51.0	319°11.1	-22°34.7	291°17.1	-21°48.6
5	235°41.2	291°48.7	-19°05.0	197°02.7	15°51.5	334°13.3	-22°34.7	306°19.4	-21°48.6
6	250°43.7	306°48.1	-19°04.5	212°03.5	15°52.1	349°15.4	-22°34.7	321°21.6	-21°48.6
7	265°46.1	321°47.4	-19°03.9	227°04.3	15°52.6	4°17.6	-22°34.7	336°23.9	-21°48.6
8	280°48.6	336°46.8	-19°03.4	242°05.1	15°53.2	19°19.7	-22°34.7	351°26.1	-21°48.5
9	295°51.1	351°46.2	-19°02.9	257°05.9	15°53.7	34°21.9	-22°34.8	6°28.3	-21°48.5
10	310°53.5	6°45.6	-19°02.4	272°06.8	15°54.3	49°24.1	-22°34.8	21°30.6	-21°48.5
11	325°56.0	21°44.9	-19°01.9	287°07.6	15°54.8	64°26.2	-22°34.8	36°32.8	-21°48.5
12	340°58.4	36°44.3	-19°01.4	302°08.4	15°55.4	79°28.4	-22°34.8	51°35.1	-21°48.4
13	356°00.9	51°43.7	-19°00.9	317°09.2	15°55.9	94°30.6	-22°34.8	66°37.3	-21°48.4
14	11°03.4	66°43.0	-19°00.4	332°10.0	15°56.5	109°32.7	-22°34.8	81°39.5	-21°48.4
15	26°05.8	81°42.4	-18°59.9	347°10.8	15°57.0	124°34.9	-22°34.9	96°41.8	-21°48.4
16	41°08.3	96°41.8	-18°59.4	2°11.6	15°57.5	139°37.1	-22°34.9	111°44.0	-21°48.3
17	56°10.8	111°41.1	-18°58.9	17°12.4	15°58.1	154°39.2	-22°34.9	126°46.3	-21°48.3
18	71°13.2	126°40.5	-18°58.4	32°13.3	15°58.6	169°41.4	-22°34.9	141°48.5	-21°48.3
19	86°15.7	141°39.9	-18°57.9	47°14.1	15°59.2	184°43.6	-22°34.9	156°50.7	-21°48.2
20	101°18.2	156°39.3	-18°57.3	62°14.9	15°59.7	199°45.7	-22°34.9	171°53.0	-21°48.2
21	116°20.6	171°38.6	-18°56.8	77°15.7	16°00.3	214°47.9	-22°34.9	186°55.2	-21°48.2
22	131°23.1	186°38.0	-18°56.3	92°16.5	16°00.8	229°50.1	-22°35.0	201°57.5	-21°48.2
23	146°25.6	201°37.4	-18°55.8	107°17.3	16°01.3	244°52.2	-22°35.0	216°59.7	-21°48.1
Mer.pass.:13:15		v-0.6 d0.5 m-4.0		v0.8 d0.5 m1.2		v2.2 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	161°28.0	216°36.8	-18°55.3	122°18.1	16°01.9	259°54.4	-22°35.0	232°01.9	-21°48.1
1	176°30.5	231°36.1	-18°54.8	137°18.9	16°02.4	274°56.6	-22°35.0	247°04.2	-21°48.1
2	191°32.9	246°35.5	-18°54.2	152°19.7	16°03.0	289°58.8	-22°35.0	262°06.4	-21°48.1
3	206°35.4	261°34.9	-18°53.7	167°20.6	16°03.5	305°00.9	-22°35.0	277°08.7	-21°48.0
4	221°37.9	276°34.2	-18°53.2	182°21.4	16°04.0	320°03.1	-22°35.1	292°10.9	-21°48.0
5	236°40.3	291°33.6	-18°52.7	197°22.2	16°04.6	335°05.3	-22°35.1	307°13.2	-21°48.0
6	251°42.8	306°33.0	-18°52.2	212°23.0	16°05.1	350°07.4	-22°35.1	322°15.4	-21°48.0
7	266°45.3	321°32.4	-18°51.6	227°23.8	16°05.7	5°09.6	-22°35.1	337°17.6	-21°47.9
8	281°47.7	336°31.7	-18°51.1	242°24.6	16°06.2	20°11.8	-22°35.1	352°19.9	-21°47.9
9	296°50.2	351°31.1	-18°50.6	257°25.4	16°06.7	35°13.9	-22°35.1	7°22.1	-21°47.9
10	311°52.7	6°30.5	-18°50.1	272°26.2	16°07.3	50°16.1	-22°35.1	22°24.4	-21°47.9
11	326°55.1	21°29.9	-18°49.5	287°27.0	16°07.8	65°18.3	-22°35.2	37°26.6	-21°47.8
12	341°57.6	36°29.2	-18°49.0	302°27.8	16°08.4	80°20.5	-22°35.2	52°28.9	-21°47.8
13	357°00.0	51°28.6	-18°48.5	317°28.7	16°08.9	95°22.6	-22°35.2	67°31.1	-21°47.8
14	12°02.5	66°28.0	-18°47.9	332°29.5	16°09.4	110°24.8	-22°35.2	82°33.3	-21°47.8
15	27°05.0	81°27.4	-18°47.4	347°30.3	16°10.0	125°27.0	-22°35.2	97°35.6	-21°47.7
16	42°07.4	96°26.8	-18°46.9	2°31.1	16°10.5	140°29.1	-22°35.2	112°37.8	-21°47.7
17	57°09.9	111°26.1	-18°46.3	17°31.9	16°11.1	155°31.3	-22°35.2	127°40.1	-21°47.7
18	72°12.4	126°25.5	-18°45.8	32°32.7	16°11.6	170°33.5	-22°35.3	142°42.3	-21°47.7
19	87°14.8	141°24.9	-18°45.3	47°33.5	16°12.1	185°35.7	-22°35.3	157°44.6	-21°47.6
20	102°17.3	156°24.3	-18°44.7	62°34.3	16°12.7	200°37.8	-22°35.3	172°46.8	-21°47.6
21	117°19.8	171°23.6	-18°44.2	77°35.1	16°13.2	215°40.0	-22°35.3	187°49.0	-21°47.6
22	132°22.2	186°23.0	-18°43.7	92°35.9	16°13.7	230°42.2	-22°35.3	202°51.3	-21°47.6
23	147°24.7	201°22.4	-18°43.1	107°36.7	16°14.3	245°44.4	-22°35.3	217°53.5	-21°47.5
Mer.pass.:13:11		v-0.6 d0.5 m-4.0		v0.8 d0.5 m1.2		v2.2 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.4
Schedar	349°36.6	56°38.5
Diphda	348°52.2	-17°53.2
Achernar	335°24.3	-57°08.8
Hamal	327°56.6	23°33.0
Polaris	316°15.9	89°20.9
Akamar	315°15.5	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°34.9	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°11.1
Capella	280°28.6	46°01.1
Bellatrix	278°27.8	6°21.8
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.2	-52°42.8
Sirius	258°30.0	-16°44.7
Adara	255°09.2	-29°00.2
Procyon	244°55.3	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°15.9	-59°34.5
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.1	-69°47.9
Alphard	217°51.9	-8°44.6
Regulus	207°39.0	11°52.3
Dubhe	193°46.3	61°38.8
Denebola	182°29.3	14°27.8
Gienah	175°48.0	-17°38.9
Acrux	173°04.3	-63°12.1
Gacrux	171°56.0	-57°13.1
Alioth	166°16.8	55°51.2
Spica	158°26.9	-11°15.6
Alcaid	152°55.5	49°12.9
Hadar	148°41.9	-60°27.6
Menkent	148°02.7	-36°27.6
Arcturus	145°51.8	19°05.2
Rigil Kent.	139°46.1	-60°54.5
Zubenelg.	137°01.0	-16°07.2
Kochab	137°19.6	74°04.4
Alphecca	126°07.6	26°38.9
Antares	112°21.5	-26°28.3
Atria	107°19.8	-69°03.3
Sabik	102°08.1	-15°44.8
Shaula	96°16.7	-37°06.8
Rasalhague	96°02.9	12°32.7
Etamin	90°44.5	51°29.0
Kaus Aust.	83°38.8	-34°22.3
Vega	80°36.6	38°47.9
Nunki	75°53.7	-26°16.2
Altair	62°04.8	8°55.0
Peacock	53°13.6	-56°40.3
Deneb	49°29.2	45°20.8
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.1
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/2	**SHA**	**Mer.pass**
Venus	57°37.4	09:32
Mars	322°09.3	15:53
Jupiter	98°40.9	06:46
Saturn	70°44.8	08:38

2019/3/3	**SHA**	**Mer.pass**
Venus	56°23.0	09:33
Mars	321°29.7	15:51
Jupiter	98°33.6	06:43
Saturn	70°39.3	08:34

2019/3/4	**SHA**	**Mer.pass**
Venus	55°08.7	09:34
Mars	320°50.1	15:50
Jupiter	98°26.4	06:39
Saturn	70°33.9	08:31

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	176°55.7	-7°24.0	227°18.8	11.5	-21°22.3	1.8	54.3
1	191°55.8	-7°23.0	241°49.3	11.6	-21°20.5	1.9	54.3
2	206°56.0	-7°22.1	256°19.9	11.6	-21°18.5	2.0	54.3
3	221°56.1	-7°21.1	270°50.5	11.6	-21°16.4	2.1	54.3
4	236°56.2	-7°20.1	285°21.2	11.7	-21°14.3	2.2	54.3
5	251°56.3	-7°19.2	299°51.8	11.7	-21°12.0	2.3	54.2
6	266°56.5	-7°18.2	314°22.5	11.7	-21°09.7	2.4	54.2
7	281°56.6	-7°17.3	328°53.2	11.7	-21°07.2	2.5	54.2
8	296°56.7	-7°16.3	343°24.0	11.8	-21°04.7	2.6	54.2
9	311°56.8	-7°15.4	357°54.8	11.8	-21°02.0	2.7	54.2
10	326°57.0	-7°14.4	12°25.6	11.8	-20°59.3	2.8	54.2
11	341°57.1	-7°13.5	26°56.4	11.8	-20°56.4	2.9	54.2
12	356°57.2	-7°12.5	41°27.3	11.9	-20°53.5	3.0	54.2
13	11°57.3	-7°11.6	55°58.1	11.9	-20°50.4	3.1	54.2
14	26°57.5	-7°10.6	70°29.1	11.9	-20°47.3	3.2	54.2
15	41°57.6	-7°09.7	85°00.0	12.0	-20°44.1	3.3	54.1
16	56°57.7	-7°08.7	99°31.0	12.0	-20°40.8	3.4	54.1
17	71°57.8	-7°07.7	114°02.0	12.0	-20°37.3	3.5	54.1
18	86°58.0	-7°06.8	128°33.0	12.1	-20°33.8	3.6	54.1
19	101°58.1	-7°05.8	143°04.1	12.1	-20°30.2	3.7	54.1
20	116°58.2	-7°04.9	157°35.2	12.1	-20°26.5	3.7	54.1
21	131°58.3	-7°03.9	172°06.3	12.1	-20°22.7	3.8	54.1
22	146°58.5	-7°03.0	186°37.5	12.2	-20°18.8	3.9	54.1
23	161°58.6	-7°02.0	201°08.7	12.2	-20°14.9	4.0	54.1
	SD.=16.1	d=1.0			S.D.=14.8		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	176°58.7	-7°01.1	215°39.9	12.2	-20°10.8	4.1	54.1
1	191°58.8	-7°00.1	230°11.2	12.3	-20°06.6	4.2	54.1
2	206°59.0	-6°59.1	244°42.5	12.3	-20°02.4	4.3	54.1
3	221°59.1	-6°58.2	259°13.8	12.3	-19°58.0	4.4	54.1
4	236°59.2	-6°57.2	273°45.2	12.4	-19°53.6	4.5	54.0
5	251°59.4	-6°56.3	288°16.6	12.4	-19°49.1	4.6	54.0
6	266°59.5	-6°55.3	302°48.0	12.4	-19°44.5	4.7	54.0
7	281°59.6	-6°54.4	317°19.5	12.5	-19°39.8	4.7	54.0
8	296°59.7	-6°53.4	331°51.0	12.5	-19°35.0	4.8	54.0
9	311°59.9	-6°52.4	346°22.5	12.5	-19°30.1	4.9	54.0
10	327°00.0	-6°51.5	0°54.1	12.6	-19°25.1	5.0	54.0
11	342°00.1	-6°50.5	15°25.7	12.6	-19°20.1	5.1	54.0
12	357°00.3	-6°49.6	29°57.3	12.7	-19°14.9	5.2	54.0
13	12°00.4	-6°48.6	44°29.0	12.7	-19°09.7	5.3	54.0
14	27°00.5	-6°47.6	59°00.7	12.7	-19°04.4	5.4	54.0
15	42°00.7	-6°46.7	73°32.4	12.8	-18°59.0	5.4	54.0
16	57°00.8	-6°45.7	88°04.2	12.8	-18°53.5	5.5	54.0
17	72°00.9	-6°44.8	102°36.0	12.8	-18°48.0	5.6	54.0
18	87°01.0	-6°43.8	117°07.8	12.9	-18°42.3	5.7	54.0
19	102°01.2	-6°42.8	131°39.7	12.9	-18°36.6	5.8	54.0
20	117°01.3	-6°41.9	146°11.6	12.9	-18°30.8	5.9	54.0
21	132°01.4	-6°40.9	160°43.6	13.0	-18°24.9	5.9	54.0
22	147°01.6	-6°40.0	175°15.6	13.0	-18°18.9	6.0	54.0
23	162°01.7	-6°39.0	189°47.6	13.0	-18°12.9	6.1	54.0
	SD.=16.1	d=1.0			S.D.=14.8		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°01.8	-6°38.0	204°19.7	13.1	-18°06.7	6.2	54.0
1	192°02.0	-6°37.1	218°51.8	13.1	-18°00.5	6.3	54.0
2	207°02.1	-6°36.1	233°23.9	13.1	-17°54.2	6.3	54.0
3	222°02.2	-6°35.2	247°56.1	13.2	-17°47.9	6.4	54.0
4	237°02.4	-6°34.2	262°28.3	13.2	-17°41.4	6.5	54.0
5	252°02.5	-6°33.2	277°00.5	13.3	-17°34.9	6.6	54.0
6	267°02.6	-6°32.3	291°32.8	13.3	-17°28.3	6.6	54.0
7	282°02.8	-6°31.3	306°05.1	13.3	-17°21.6	6.7	54.0
8	297°02.9	-6°30.4	320°37.4	13.4	-17°14.9	6.8	54.0
9	312°03.0	-6°29.4	335°09.8	13.4	-17°08.0	6.9	54.0
10	327°03.2	-6°28.4	349°42.2	13.4	-17°01.1	6.9	54.0
11	342°03.3	-6°27.5	4°14.7	13.5	-16°54.1	7.0	54.0
12	357°03.4	-6°26.5	18°47.2	13.5	-16°47.1	7.1	54.0
13	12°03.6	-6°25.5	33°19.7	13.5	-16°40.0	7.2	54.0
14	27°03.7	-6°24.6	47°52.2	13.6	-16°32.8	7.2	54.0
15	42°03.8	-6°23.6	62°24.8	13.6	-16°25.5	7.3	54.0
16	57°04.0	-6°22.7	76°57.5	13.6	-16°18.1	7.4	54.0
17	72°04.1	-6°21.7	91°30.1	13.7	-16°10.7	7.4	54.0
18	87°04.3	-6°20.7	106°02.8	13.7	-16°03.2	7.5	54.0
19	102°04.4	-6°19.8	120°35.6	13.7	-15°55.7	7.6	54.0
20	117°04.5	-6°18.8	135°08.3	13.8	-15°48.1	7.7	54.0
21	132°04.7	-6°17.8	149°41.1	13.8	-15°40.4	7.7	54.0
22	147°04.8	-6°16.9	164°14.0	13.9	-15°32.6	7.8	54.0
23	162°04.9	-6°15.9	178°46.8	13.9	-15°24.8	7.9	54.0
	SD.=16.1	d=1.0			S.D.=14.7		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:01	06:20	07:28	16:58	18:07	19:25
70	05:07	06:18	07:19	17:06	18:08	19:19
68	05:12	06:16	07:12	17:13	18:09	19:14
66	05:16	06:15	07:07	17:19	18:10	19:10
64	05:19	06:14	07:02	17:24	18:12	19:07
62	05:22	06:13	06:57	17:28	18:12	19:04
60	05:24	06:12	06:54	17:32	18:13	19:02
58	05:26	06:11	06:50	17:35	18:14	18:60
56	05:27	06:10	06:47	17:38	18:15	18:58
54	05:28	06:09	06:45	17:40	18:16	18:57
52	05:29	06:08	06:42	17:43	18:16	18:56
50	05:30	06:08	06:40	17:45	18:17	18:55
45	05:32	06:06	06:35	17:50	18:19	18:53
40	05:33	06:04	06:31	17:54	18:21	18:52
35	05:33	06:02	06:27	17:57	18:22	18:52
30	05:33	06:00	06:24	18:00	18:24	18:52
20	05:31	05:56	06:19	18:06	18:28	18:53
10	05:28	05:52	06:14	18:11	18:32	18:56
0	05:24	05:48	06:09	18:15	18:36	19:00
-10	05:18	05:43	06:04	18:20	18:41	19:06
-20	05:10	05:36	05:58	18:25	18:48	19:14
-30	04:59	05:28	05:52	18:31	18:56	19:24
-35	04:52	05:23	05:48	18:35	19:01	19:31
-40	04:44	05:17	05:44	18:39	19:07	19:39
-45	04:33	05:09	05:39	18:44	19:14	19:50
-50	04:20	05:00	05:33	18:49	19:23	20:03
-52	04:13	04:56	05:31	18:52	19:27	20:09
-54	04:06	04:51	05:28	18:55	19:32	20:17
-56	03:57	04:45	05:24	18:58	19:37	20:25
-58	03:47	04:39	05:21	19:02	19:43	20:34
-60	03:36	04:32	05:17	19:06	19:50	20:46

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	09:28	–:–	–:–	12:10
70	–:–	09:06	08:33	–:–	10:55	13:04
68	08:00	08:01	07:60	10:22	11:59	13:36
66	07:07	07:26	07:35	11:14	12:34	13:60
64	06:35	07:00	07:16	11:46	12:59	14:18
62	06:11	06:40	07:01	12:10	13:19	14:33
60	05:52	06:24	06:47	12:29	13:35	14:46
58	05:36	06:10	06:36	12:44	13:48	14:57
56	05:22	05:58	06:26	12:58	13:60	15:06
54	05:11	05:48	06:17	13:09	14:10	15:15
52	05:00	05:38	06:10	13:20	14:19	15:22
50	04:51	05:30	06:03	13:29	14:27	15:29
45	04:32	05:12	05:47	13:48	14:44	15:43
40	04:16	04:58	05:35	14:03	14:58	15:55
35	04:02	04:45	05:24	14:17	15:10	16:05
30	03:51	04:35	05:15	14:28	15:20	16:13
20	03:31	04:16	04:59	14:47	15:38	16:28
10	03:13	04:00	04:45	15:04	15:53	16:41
0	02:57	03:45	04:31	15:20	16:08	16:53
-10	02:41	03:30	04:18	15:36	16:22	17:06
-20	02:23	03:14	04:04	15:53	16:37	17:18
-30	02:03	02:55	03:48	16:12	16:54	17:33
-35	01:51	02:44	03:38	16:23	17:04	17:41
-40	01:38	02:32	03:27	16:36	17:16	17:51
-45	01:22	02:17	03:14	16:51	17:29	18:02
-50	01:02	01:59	02:59	17:10	17:46	18:16
-52	00:53	01:50	02:52	17:19	17:53	18:22
-54	00:43	01:41	02:43	17:29	18:02	18:29
-56	00:31	01:30	02:34	17:40	18:11	18:37
-58	00:17	01:17	02:24	17:52	18:22	18:45
-60	00:01	01:03	02:12	18:07	18:35	18:55

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
2	12:17	12:11	12:12	09:08	21:32	26(15%)
3	12:05	11:59	12:11	09:56	22:19	27(9%)
4	11:53	11:46	12:11	10:42	23:05	28(4%)

March 05, 06 ,07 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	162°27.2	216°21.8	-18°42.6	122°37.6	16°14.8	260°46.5	-22°35.3	232°55.8	-21°47.5
1	177°29.6	231°21.2	-18°42.0	137°38.4	16°15.4	275°48.7	-22°35.4	247°58.0	-21°47.5
2	192°32.1	246°20.5	-18°41.5	152°39.2	16°15.9	290°50.9	-22°35.4	263°00.3	-21°47.4
3	207°34.5	261°19.9	-18°41.0	167°40.0	16°16.4	305°53.1	-22°35.4	278°02.5	-21°47.4
4	222°37.0	276°19.3	-18°40.4	182°40.8	16°17.0	320°55.3	-22°35.4	293°04.8	-21°47.4
5	237°39.5	291°18.7	-18°39.9	197°41.6	16°17.5	335°57.4	-22°35.4	308°07.0	-21°47.4
6	252°41.9	306°18.0	-18°39.3	212°42.4	16°18.0	350°59.6	-22°35.4	323°09.2	-21°47.3
7	267°44.4	321°17.4	-18°38.8	227°43.2	16°18.6	6°01.8	-22°35.5	338°11.5	-21°47.3
8	282°46.9	336°16.8	-18°38.2	242°44.0	16°19.1	21°04.0	-22°35.5	353°13.7	-21°47.3
9	297°49.3	351°16.2	-18°37.7	257°44.8	16°19.6	36°06.1	-22°35.5	8°16.0	-21°47.3
10	312°51.8	6°15.6	-18°37.1	272°45.6	16°20.2	51°08.3	-22°35.5	23°18.2	-21°47.2
11	327°54.3	21°15.0	-18°36.6	287°46.4	16°20.7	66°10.5	-22°35.5	38°20.5	-21°47.2
12	342°56.7	36°14.3	-18°36.0	302°47.2	16°21.2	81°12.7	-22°35.5	53°22.7	-21°47.2
13	357°59.2	51°13.7	-18°35.5	317°48.0	16°21.8	96°14.9	-22°35.5	68°25.0	-21°47.2
14	13°01.6	66°13.1	-18°34.9	332°48.9	16°22.3	111°17.0	-22°35.6	83°27.2	-21°47.1
15	28°04.1	81°12.5	-18°34.4	347°49.7	16°22.8	126°19.2	-22°35.6	98°29.5	-21°47.1
16	43°06.6	96°11.9	-18°33.8	2°50.5	16°23.4	141°21.4	-22°35.6	113°31.7	-21°47.1
17	58°09.0	111°11.2	-18°33.3	17°51.3	16°23.9	156°23.6	-22°35.6	128°33.9	-21°47.1
18	73°11.5	126°10.6	-18°32.7	32°52.1	16°24.4	171°25.8	-22°35.6	143°36.2	-21°47.0
19	88°14.0	141°10.0	-18°32.2	47°52.9	16°25.0	186°27.9	-22°35.6	158°38.4	-21°47.0
20	103°16.4	156°09.4	-18°31.6	62°53.7	16°25.5	201°30.1	-22°35.6	173°40.7	-21°47.0
21	118°18.9	171°08.8	-18°31.0	77°54.5	16°26.0	216°32.3	-22°35.7	188°42.9	-21°47.0
22	133°21.4	186°08.2	-18°30.5	92°55.3	16°26.6	231°34.5	-22°35.7	203°45.2	-21°46.9
23	148°23.8	201°07.5	-18°29.9	107°56.1	16°27.1	246°36.7	-22°35.7	218°47.4	-21°46.9
Mer.pass.:13:08		v-0.6 d0.5 m-4.0		v0.8 d0.5 m1.2		v2.2 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	163°26.3	216°06.9	-18°29.4	122°56.9	16°27.6	261°38.8	-22°35.7	233°49.7	-21°46.9
1	178°28.8	231°06.3	-18°28.8	137°57.7	16°28.2	276°41.0	-22°35.7	248°51.9	-21°46.9
2	193°31.2	246°05.7	-18°28.2	152°58.5	16°28.7	291°43.2	-22°35.7	263°54.2	-21°46.8
3	208°33.7	261°05.1	-18°27.7	167°59.3	16°29.2	306°45.4	-22°35.7	278°56.4	-21°46.8
4	223°36.1	276°04.5	-18°27.1	183°00.1	16°29.7	321°47.6	-22°35.8	293°58.7	-21°46.8
5	238°38.6	291°03.9	-18°26.5	198°00.9	16°30.3	336°49.8	-22°35.8	309°00.9	-21°46.8
6	253°41.1	306°03.2	-18°26.0	213°01.7	16°30.8	351°51.9	-22°35.8	324°03.2	-21°46.7
7	268°43.5	321°02.6	-18°25.4	228°02.5	16°31.3	6°54.1	-22°35.8	339°05.4	-21°46.7
8	283°46.0	336°02.0	-18°24.8	243°03.3	16°31.9	21°56.3	-22°35.8	354°07.7	-21°46.7
9	298°48.5	351°01.4	-18°24.3	258°04.2	16°32.4	36°58.5	-22°35.8	9°09.9	-21°46.7
10	313°50.9	6°00.8	-18°23.7	273°05.0	16°32.9	52°00.7	-22°35.8	24°12.2	-21°46.6
11	328°53.4	21°00.2	-18°23.1	288°05.8	16°33.5	67°02.9	-22°35.8	39°14.4	-21°46.6
12	343°55.9	35°59.6	-18°22.5	303°06.6	16°34.0	82°05.1	-22°35.9	54°16.7	-21°46.6
13	358°58.3	50°58.9	-18°22.0	318°07.4	16°34.5	97°07.2	-22°35.9	69°18.9	-21°46.6
14	14°00.8	65°58.3	-18°21.4	333°08.2	16°35.0	112°09.4	-22°35.9	84°21.1	-21°46.5
15	29°03.3	80°57.7	-18°20.8	348°09.0	16°35.6	127°11.6	-22°35.9	99°23.4	-21°46.5
16	44°05.7	95°57.1	-18°20.2	3°09.8	16°36.1	142°13.8	-22°35.9	114°25.6	-21°46.5
17	59°08.2	110°56.5	-18°19.7	18°10.6	16°36.6	157°16.0	-22°35.9	129°27.9	-21°46.5
18	74°10.6	125°55.9	-18°19.1	33°11.4	16°37.1	172°18.2	-22°35.9	144°30.1	-21°46.4
19	89°13.1	140°55.3	-18°18.5	48°12.2	16°37.7	187°20.4	-22°36.0	159°32.4	-21°46.4
20	104°15.6	155°54.7	-18°17.9	63°13.0	16°38.2	202°22.6	-22°36.0	174°34.6	-21°46.4
21	119°18.0	170°54.1	-18°17.3	78°13.8	16°38.7	217°24.7	-22°36.0	189°36.9	-21°46.4
22	134°20.5	185°53.4	-18°16.8	93°14.6	16°39.3	232°26.9	-22°36.0	204°39.1	-21°46.3
23	149°23.0	200°52.8	-18°16.2	108°15.4	16°39.8	247°29.1	-22°36.0	219°41.4	-21°46.3
Mer.pass.:13:04		v-0.6 d0.6 m-4.0		v0.8 d0.5 m1.2		v2.2 d-0.0 m-1.9		v2.2 d0.0 m0.6	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	164°25.4	215°52.2	-18°15.6	123°16.2	16°40.3	262°31.3	-22°36.0	234°43.6	-21°46.3
1	179°27.9	230°51.6	-18°15.0	138°17.0	16°40.8	277°33.5	-22°36.0	249°45.9	-21°46.3
2	194°30.4	245°51.0	-18°14.4	153°17.8	16°41.4	292°35.7	-22°36.1	264°48.1	-21°46.2
3	209°32.8	260°50.4	-18°13.8	168°18.6	16°41.9	307°37.9	-22°36.1	279°50.4	-21°46.2
4	224°35.3	275°49.8	-18°13.3	183°19.4	16°42.4	322°40.1	-22°36.1	294°52.7	-21°46.2
5	239°37.7	290°49.2	-18°12.7	198°20.2	16°42.9	337°42.3	-22°36.1	309°54.9	-21°46.2
6	254°40.2	305°48.6	-18°12.1	213°21.0	16°43.4	352°44.4	-22°36.1	324°57.2	-21°46.1
7	269°42.7	320°48.0	-18°11.5	228°21.8	16°44.0	7°46.6	-22°36.1	339°59.4	-21°46.1
8	284°45.1	335°47.4	-18°10.9	243°22.6	16°44.5	22°48.8	-22°36.1	355°01.7	-21°46.1
9	299°47.6	350°46.8	-18°10.3	258°23.4	16°45.0	37°51.0	-22°36.1	10°03.9	-21°46.1
10	314°50.1	5°46.2	-18°09.7	273°24.2	16°45.5	52°53.2	-22°36.2	25°06.2	-21°46.0
11	329°52.5	20°45.5	-18°09.1	288°25.0	16°46.1	67°55.4	-22°36.2	40°08.4	-21°46.0
12	344°55.0	35°44.9	-18°08.5	303°25.8	16°46.6	82°57.6	-22°36.2	55°10.7	-21°46.0
13	359°57.5	50°44.3	-18°07.9	318°26.6	16°47.1	97°59.8	-22°36.2	70°12.9	-21°46.0
14	14°59.9	65°43.7	-18°07.3	333°27.4	16°47.6	113°02.0	-22°36.2	85°15.2	-21°45.9
15	30°02.4	80°43.1	-18°06.7	348°28.2	16°48.2	128°04.2	-22°36.2	100°17.4	-21°45.9
16	45°04.9	95°42.5	-18°06.1	3°29.0	16°48.7	143°06.4	-22°36.2	115°19.7	-21°45.9
17	60°07.3	110°41.9	-18°05.5	18°29.8	16°49.2	158°08.6	-22°36.3	130°21.9	-21°45.9
18	75°09.8	125°41.3	-18°04.9	33°30.6	16°49.7	173°10.8	-22°36.3	145°24.2	-21°45.8
19	90°12.2	140°40.7	-18°04.3	48°31.4	16°50.2	188°13.0	-22°36.3	160°26.4	-21°45.8
20	105°14.7	155°40.1	-18°03.7	63°32.2	16°50.8	203°15.2	-22°36.3	175°28.7	-21°45.8
21	120°17.2	170°39.5	-18°03.1	78°33.0	16°51.3	218°17.3	-22°36.3	190°30.9	-21°45.8
22	135°19.6	185°38.9	-18°02.5	93°33.8	16°51.8	233°19.5	-22°36.3	205°33.2	-21°45.7
23	150°22.1	200°38.3	-18°01.9	108°34.6	16°52.3	248°21.7	-22°36.3	220°35.4	-21°45.7
Mer.pass.:13:00		v-0.6 d0.6 m-3.9		v0.8 d0.5 m1.2		v2.2 d-0.0 m-1.9		v2.3 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.4
Schedar	349°36.6	56°38.5
Diphda	348°52.2	-17°53.2
Achernar	335°24.3	-57°08.7
Hamal	327°56.6	23°33.0
Polaris	316°17.3	89°20.9
Akamar	315°15.6	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°34.9	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°11.1
Capella	280°28.6	46°01.1
Bellatrix	278°27.8	6°21.8
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.2	-52°42.8
Sirius	258°30.0	-16°44.7
Adara	255°09.3	-29°00.2
Procyon	244°55.4	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°16.0	-59°34.5
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.1	-69°47.9
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.8
Denebola	182°29.3	14°27.8
Gienah	175°47.9	-17°38.9
Acrux	173°04.3	-63°12.1
Gacrux	171°56.0	-57°13.1
Alioth	166°16.8	55°51.3
Spica	158°26.9	-11°15.6
Alcaid	152°55.5	49°12.9
Hadar	148°41.9	-60°27.6
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.2
Rigil Kent.	139°46.1	-60°54.5
Zubenelg.	137°00.9	-16°07.2
Kochab	137°19.5	74°04.4
Alphecca	126°07.6	26°38.9
Antares	112°21.4	-26°28.3
Atria	107°19.8	-69°03.3
Sabik	102°08.1	-15°44.8
Shaula	96°16.7	-37°06.8
Rasalhague	96°02.9	12°32.7
Etamin	90°44.5	51°29.0
Kaus Aust.	83°38.8	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°53.7	-26°16.2
Altair	62°04.7	8°55.0
Peacock	53°13.6	-56°40.2
Deneb	49°29.2	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.1
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/5	SHA	Mer.pass
Venus	53°54.6	09:35
Mars	320°10.4	15:49
Jupiter	98°19.4	06:36
Saturn	70°28.6	08:27

2019/3/6	SHA	Mer.pass
Venus	52°40.6	09:36
Mars	319°30.6	15:47
Jupiter	98°12.6	06:32
Saturn	70°23.4	08:23

2019/3/7	SHA	Mer.pass
Venus	51°26.8	09:37
Mars	318°50.8	15:46
Jupiter	98°05.9	06:29
Saturn	70°18.2	08:20

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°05.1	-6°14.9	193°19.7	13.9	-15°16.9	7.9	54.0
1	192°05.2	-6°14.0	207°52.7	14.0	-15°09.0	8.0	54.0
2	207°05.3	-6°13.0	222°25.6	14.0	-15°00.9	8.1	54.0
3	222°05.5	-6°12.1	236°58.6	14.0	-14°52.8	8.1	54.0
4	237°05.6	-6°11.1	251°31.7	14.1	-14°44.7	8.2	54.0
5	252°05.8	-6°10.1	266°04.7	14.1	-14°36.5	8.2	54.0
6	267°05.9	-6°09.2	280°37.8	14.1	-14°28.2	8.3	54.0
7	282°06.0	-6°08.2	295°11.0	14.1	-14°19.9	8.4	54.0
8	297°06.2	-6°07.2	309°44.1	14.2	-14°11.5	8.4	54.0
9	312°06.3	-6°06.3	324°17.3	14.2	-14°03.0	8.5	54.0
10	327°06.5	-6°05.3	338°50.5	14.2	-13°54.5	8.6	54.0
11	342°06.6	-6°04.3	353°23.8	14.3	-13°45.9	8.6	54.0
12	357°06.7	-6°03.4	7°57.1	14.3	-13°37.2	8.7	54.0
13	12°06.9	-6°02.4	22°30.4	14.3	-13°28.5	8.7	54.0
14	27°07.0	-6°01.4	37°03.7	14.4	-13°19.8	8.8	54.0
15	42°07.1	-6°00.5	51°37.1	14.4	-13°11.0	8.8	54.0
16	57°07.3	-5°59.5	66°10.5	14.4	-13°02.1	8.9	54.0
17	72°07.4	-5°58.5	80°44.0	14.4	-12°53.2	9.0	54.0
18	87°07.6	-5°57.6	95°17.4	14.5	-12°44.2	9.0	54.0
19	102°07.7	-5°56.6	109°50.9	14.5	-12°35.1	9.1	54.0
20	117°07.8	-5°55.6	124°24.4	14.5	-12°26.1	9.1	54.0
21	132°08.0	-5°54.7	138°58.0	14.6	-12°16.9	9.2	54.0
22	147°08.1	-5°53.7	153°31.6	14.6	-12°07.7	9.2	54.1
23	162°08.3	-5°52.7	168°05.2	14.6	-11°58.5	9.3	54.1
	SD.=16.1	d=1.0			S.D.=14.7		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°08.4	-5°51.8	182°38.8	14.6	-11°49.2	9.3	54.1
1	192°08.6	-5°50.8	197°12.4	14.7	-11°39.8	9.4	54.1
2	207°08.7	-5°49.8	211°46.1	14.7	-11°30.4	9.4	54.1
3	222°08.8	-5°48.9	226°19.8	14.7	-11°20.9	9.5	54.1
4	237°09.0	-5°47.9	240°53.6	14.7	-11°11.4	9.5	54.1
5	252°09.1	-5°46.9	255°27.3	14.8	-11°01.9	9.6	54.1
6	267°09.3	-5°45.9	270°01.1	14.8	-10°52.3	9.6	54.1
7	282°09.4	-5°45.0	284°34.9	14.8	-10°42.6	9.7	54.1
8	297°09.5	-5°44.0	299°08.7	14.8	-10°32.9	9.7	54.1
9	312°09.7	-5°43.0	313°42.6	14.9	-10°23.2	9.8	54.1
10	327°09.8	-5°42.1	328°16.4	14.9	-10°13.4	9.8	54.1
11	342°10.0	-5°41.1	342°50.3	14.9	-10°03.6	9.9	54.1
12	357°10.1	-5°40.1	357°24.2	14.9	-9°53.7	9.9	54.1
13	12°10.3	-5°39.2	11°58.2	14.9	-9°43.8	9.9	54.2
14	27°10.4	-5°38.2	26°32.1	15.0	-9°33.8	10.0	54.2
15	42°10.6	-5°37.2	41°06.1	15.0	-9°23.8	10.0	54.2
16	57°10.7	-5°36.3	55°40.1	15.0	-9°13.8	10.1	54.2
17	72°10.8	-5°35.3	70°14.1	15.0	-9°03.7	10.1	54.2
18	87°11.0	-5°34.3	84°48.1	15.0	-8°53.6	10.1	54.2
19	102°11.1	-5°33.3	99°22.2	15.1	-8°43.4	10.2	54.2
20	117°11.3	-5°32.4	113°56.2	15.1	-8°33.2	10.2	54.2
21	132°11.4	-5°31.4	128°30.3	15.1	-8°23.0	10.3	54.2
22	147°11.6	-5°30.4	143°04.4	15.1	-8°12.7	10.3	54.2
23	162°11.7	-5°29.5	157°38.5	15.1	-8°02.4	10.3	54.2
	SD.=16.1	d=1.0			S.D.=14.7		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	177°11.9	-5°28.5	172°12.6	15.1	-7°52.0	10.4	54.2
1	192°12.0	-5°27.5	186°46.8	15.1	-7°41.7	10.4	54.3
2	207°12.2	-5°26.5	201°20.9	15.2	-7°31.2	10.4	54.3
3	222°12.3	-5°25.6	215°55.1	15.2	-7°20.8	10.5	54.3
4	237°12.4	-5°24.6	230°29.3	15.2	-7°10.3	10.5	54.3
5	252°12.6	-5°23.6	245°03.5	15.2	-6°59.8	10.5	54.3
6	267°12.7	-5°22.7	259°37.7	15.2	-6°49.2	10.6	54.3
7	282°12.9	-5°21.7	274°11.9	15.2	-6°38.6	10.6	54.3
8	297°13.0	-5°20.7	288°46.1	15.2	-6°28.0	10.6	54.3
9	312°13.2	-5°19.7	303°20.4	15.2	-6°17.4	10.7	54.3
10	327°13.3	-5°18.8	317°54.6	15.3	-6°06.7	10.7	54.3
11	342°13.5	-5°17.8	332°28.9	15.3	-5°56.0	10.7	54.4
12	357°13.6	-5°16.8	347°03.1	15.3	-5°45.3	10.7	54.4
13	12°13.8	-5°15.9	1°37.4	15.3	-5°34.5	10.8	54.4
14	27°13.9	-5°14.9	16°11.7	15.3	-5°23.7	10.8	54.4
15	42°14.1	-5°13.9	30°46.0	15.3	-5°12.9	10.8	54.4
16	57°14.2	-5°12.9	45°20.3	15.3	-5°02.1	10.8	54.4
17	72°14.4	-5°12.0	59°54.5	15.3	-4°51.2	10.9	54.4
18	87°14.5	-5°11.0	74°28.8	15.3	-4°40.3	10.9	54.4
19	102°14.7	-5°10.0	89°03.2	15.3	-4°29.4	10.9	54.4
20	117°14.8	-5°09.0	103°37.5	15.3	-4°18.5	10.9	54.5
21	132°15.0	-5°08.1	118°11.8	15.3	-4°07.6	11.0	54.5
22	147°15.1	-5°07.1	132°46.1	15.3	-3°56.6	11.0	54.5
23	162°15.3	-5°06.1	147°20.4	15.3	-3°45.6	11.0	54.5
	SD.=16.1	d=1.0			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:46	06:05	07:12	17:12	18:20	19:40
70	04:54	06:05	07:05	17:19	18:20	19:32
68	04:60	06:04	06:60	17:24	18:20	19:25
66	05:05	06:04	06:55	17:29	18:20	19:20
64	05:09	06:04	06:51	17:33	18:20	19:16
62	05:12	06:04	06:48	17:36	18:21	19:12
60	05:15	06:03	06:45	17:39	18:21	19:09
58	05:18	06:03	06:42	17:42	18:21	19:06
56	05:20	06:03	06:40	17:44	18:21	19:04
54	05:21	06:02	06:38	17:46	18:21	19:02
52	05:23	06:02	06:36	17:48	18:22	19:01
50	05:24	06:02	06:34	17:50	18:22	18:60
45	05:27	06:00	06:30	17:54	18:23	18:57
40	05:28	05:59	06:26	17:57	18:24	18:55
35	05:29	05:58	06:23	17:60	18:25	18:54
30	05:29	05:57	06:21	18:02	18:26	18:54
20	05:29	05:54	06:16	18:07	18:29	18:54
10	05:27	05:51	06:12	18:11	18:32	18:56
0	05:23	05:47	06:08	18:15	18:35	18:59
-10	05:18	05:43	06:04	18:19	18:40	19:04
-20	05:11	05:37	05:59	18:23	18:45	19:11
-30	05:02	05:30	05:54	18:28	18:52	19:20
-35	04:55	05:25	05:51	18:31	18:57	19:27
-40	04:48	05:20	05:48	18:34	19:02	19:34
-45	04:38	05:14	05:43	18:38	19:08	19:44
-50	04:25	05:05	05:38	18:43	19:16	19:56
-52	04:19	05:02	05:36	18:45	19:20	20:02
-54	04:13	04:57	05:34	18:48	19:24	20:08
-56	04:05	04:52	05:31	18:51	19:29	20:16
-58	03:56	04:47	05:28	18:54	19:34	20:24
-60	03:46	04:41	05:24	18:57	19:40	20:35

	Moonrise			**Moonset**		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	08:46	08:24	08:08	14:25	16:17	18:03
70	08:18	08:08	07:59	14:51	16:32	18:10
68	07:57	07:54	07:51	15:11	16:44	18:15
66	07:40	07:43	07:45	15:27	16:54	18:20
64	07:27	07:34	07:39	15:40	17:02	18:24
62	07:15	07:26	07:35	15:51	17:09	18:27
60	07:05	07:19	07:31	15:60	17:15	18:30
58	06:56	07:13	07:27	16:08	17:20	18:33
56	06:49	07:08	07:24	16:15	17:25	18:35
54	06:42	07:03	07:21	16:21	17:29	18:37
52	06:36	06:58	07:18	16:27	17:33	18:39
50	06:30	06:54	07:16	16:32	17:36	18:41
45	06:18	06:46	07:11	16:43	17:44	18:45
40	06:08	06:38	07:06	16:52	17:50	18:48
35	05:60	06:32	07:02	16:60	17:55	18:50
30	05:52	06:26	06:59	17:07	17:60	18:53
20	05:39	06:17	06:53	17:18	18:08	18:57
10	05:27	06:08	06:48	17:28	18:15	19:00
0	05:17	06:00	06:43	17:38	18:21	19:04
-10	05:06	05:52	06:38	17:47	18:27	19:07
-20	04:54	05:44	06:33	17:57	18:34	19:10
-30	04:41	05:34	06:27	18:09	18:42	19:14
-35	04:33	05:28	06:24	18:15	18:46	19:16
-40	04:24	05:22	06:20	18:23	18:51	19:19
-45	04:14	05:14	06:15	18:31	18:57	19:22
-50	04:01	05:05	06:10	18:41	19:04	19:25
-52	03:56	05:01	06:07	18:46	19:07	19:27
-54	03:49	04:56	06:04	18:51	19:11	19:28
-56	03:42	04:51	06:01	18:57	19:15	19:30
-58	03:34	04:45	05:58	19:04	19:19	19:32
-60	03:24	04:39	05:54	19:11	19:24	19:35

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
5	11:40	11:33	12:11	11:27	23:49	29(1%)
6	11:26	11:19	12:11	12:10	00:32	30(0%)
7	11:12	11:05	12:11	12:53	00:32	1(1%)

March 08, 09 ,10 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	165°24.6	215°37.7	-18°01.3	123°35.4	16°52.8	263°23.9	-22°36.3	235°37.7	-21°45.7
1	180°27.0	230°37.1	-18°00.7	138°36.2	16°53.4	278°26.1	-22°36.4	250°40.0	-21°45.7
2	195°29.5	245°36.5	-18°00.1	153°37.0	16°53.9	293°28.3	-22°36.4	265°42.2	-21°45.6
3	210°32.0	260°35.9	-17°59.5	168°37.8	16°54.4	308°30.5	-22°36.4	280°44.5	-21°45.6
4	225°34.4	275°35.3	-17°58.9	183°38.6	16°54.9	323°32.7	-22°36.4	295°46.7	-21°45.6
5	240°36.9	290°34.7	-17°58.3	198°39.4	16°55.4	338°34.9	-22°36.4	310°49.0	-21°45.6
6	255°39.3	305°34.1	-17°57.7	213°40.2	16°56.0	353°37.1	-22°36.4	325°51.2	-21°45.5
7	270°41.8	320°33.5	-17°57.1	228°41.0	16°56.5	8°39.3	-22°36.4	340°53.5	-21°45.5
8	285°44.3	335°32.9	-17°56.4	243°41.8	16°57.0	23°41.5	-22°36.4	355°55.7	-21°45.5
9	300°46.7	350°32.3	-17°55.8	258°42.6	16°57.5	38°43.7	-22°36.5	10°58.0	-21°45.5
10	315°49.2	5°31.7	-17°55.2	273°43.4	16°58.0	53°45.9	-22°36.5	26°00.2	-21°45.4
11	330°51.7	20°31.1	-17°54.6	288°44.2	16°58.5	68°48.1	-22°36.5	41°02.5	-21°45.4
12	345°54.1	35°30.5	-17°54.0	303°45.0	16°59.1	83°50.3	-22°36.5	56°04.8	-21°45.4
13	0°56.6	50°29.9	-17°53.4	318°45.8	16°59.6	98°52.5	-22°36.5	71°07.0	-21°45.4
14	15°59.1	65°29.3	-17°52.7	333°46.6	17°00.1	113°54.7	-22°36.5	86°09.3	-21°45.3
15	31°01.5	80°28.7	-17°52.1	348°47.4	17°00.6	128°56.9	-22°36.5	101°11.5	-21°45.3
16	46°04.0	95°28.1	-17°51.5	3°48.2	17°01.1	143°59.1	-22°36.6	116°13.8	-21°45.3
17	61°06.5	110°27.5	-17°50.9	18°49.0	17°01.6	159°01.3	-22°36.6	131°16.0	-21°45.3
18	76°08.9	125°26.9	-17°50.3	33°49.8	17°02.2	174°03.5	-22°36.6	146°18.3	-21°45.2
19	91°11.4	140°26.3	-17°49.6	48°50.6	17°02.7	189°05.7	-22°36.6	161°20.5	-21°45.2
20	106°13.8	155°25.7	-17°49.0	63°51.4	17°03.2	204°07.9	-22°36.6	176°22.8	-21°45.2
21	121°16.3	170°25.1	-17°48.4	78°52.2	17°03.7	219°10.1	-22°36.6	191°25.1	-21°45.2
22	136°18.8	185°24.5	-17°47.8	93°53.0	17°04.2	234°12.3	-22°36.6	206°27.3	-21°45.1
23	151°21.2	200°23.9	-17°47.1	108°53.8	17°04.7	249°14.5	-22°36.6	221°29.6	-21°45.1
Mer.pass.:12:56		v-0.6 d0.6 m-3.9		v0.8 d0.5 m1.2		v2.2 d-0.0 m-1.9		v2.3 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	166°23.7	215°23.3	-17°46.5	123°54.6	17°05.2	264°16.7	-22°36.7	236°31.8	-21°45.1
1	181°26.2	230°22.7	-17°45.9	138°55.3	17°05.8	279°18.9	-22°36.7	251°34.1	-21°45.1
2	196°28.6	245°22.1	-17°45.3	153°56.1	17°06.3	294°21.1	-22°36.7	266°36.3	-21°45.0
3	211°31.1	260°21.5	-17°44.6	168°56.9	17°06.8	309°23.3	-22°36.7	281°38.6	-21°45.0
4	226°33.6	275°20.9	-17°44.0	183°57.7	17°07.3	324°25.5	-22°36.7	296°40.9	-21°45.0
5	241°36.0	290°20.3	-17°43.4	198°58.5	17°07.8	339°27.8	-22°36.7	311°43.1	-21°45.0
6	256°38.5	305°19.7	-17°42.7	213°59.3	17°08.3	354°30.0	-22°36.7	326°45.4	-21°44.9
7	271°40.9	320°19.1	-17°42.1	229°00.1	17°08.8	9°32.2	-22°36.7	341°47.6	-21°44.9
8	286°43.4	335°18.5	-17°41.5	244°00.9	17°09.3	24°34.4	-22°36.8	356°49.9	-21°44.9
9	301°45.9	350°17.9	-17°40.8	259°01.7	17°09.9	39°36.6	-22°36.8	11°52.1	-21°44.9
10	316°48.3	5°17.4	-17°40.2	274°02.5	17°10.4	54°38.8	-22°36.8	26°54.4	-21°44.8
11	331°50.8	20°16.8	-17°39.6	289°03.3	17°10.9	69°41.0	-22°36.8	41°56.7	-21°44.8
12	346°53.3	35°16.2	-17°38.9	304°04.1	17°11.4	84°43.2	-22°36.8	56°58.9	-21°44.8
13	1°55.7	50°15.6	-17°38.3	319°04.9	17°11.9	99°45.4	-22°36.8	72°01.2	-21°44.8
14	16°58.2	65°15.0	-17°37.7	334°05.7	17°12.4	114°47.6	-22°36.8	87°03.4	-21°44.7
15	32°00.7	80°14.4	-17°37.0	349°06.5	17°12.9	129°49.8	-22°36.8	102°05.7	-21°44.7
16	47°03.1	95°13.8	-17°36.4	4°07.3	17°13.4	144°52.0	-22°36.8	117°08.0	-21°44.7
17	62°05.6	110°13.2	-17°35.7	19°08.1	17°13.9	159°54.2	-22°36.9	132°10.2	-21°44.7
18	77°08.1	125°12.6	-17°35.1	34°08.9	17°14.5	174°56.4	-22°36.9	147°12.5	-21°44.6
19	92°10.5	140°12.0	-17°34.4	49°09.7	17°15.0	189°58.7	-22°36.9	162°14.7	-21°44.6
20	107°13.0	155°11.4	-17°33.8	64°10.5	17°15.5	205°00.9	-22°36.9	177°17.0	-21°44.6
21	122°15.4	170°10.9	-17°33.2	79°11.2	17°16.0	220°03.1	-22°36.9	192°19.3	-21°44.6
22	137°17.9	185°10.3	-17°32.5	94°12.0	17°16.5	235°05.3	-22°36.9	207°21.5	-21°44.5
23	152°20.4	200°09.7	-17°31.9	109°12.8	17°17.0	250°07.5	-22°36.9	222°23.8	-21°44.5
Mer.pass.:12:52		v-0.6 d0.6 m-3.9		v0.8 d0.5 m1.3		v2.2 d-0.0 m-1.9		v2.3 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	167°22.8	215°09.1	-17°31.2	124°13.6	17°17.5	265°09.7	-22°36.9	237°26.0	-21°44.5
1	182°25.3	230°08.5	-17°30.6	139°14.4	17°18.0	280°11.9	-22°37.0	252°28.3	-21°44.5
2	197°27.8	245°07.9	-17°29.9	154°15.2	17°18.5	295°14.1	-22°37.0	267°30.6	-21°44.5
3	212°30.2	260°07.3	-17°29.3	169°16.0	17°19.0	310°16.3	-22°37.0	282°32.8	-21°44.4
4	227°32.7	275°06.7	-17°28.6	184°16.8	17°19.5	325°18.5	-22°37.0	297°35.1	-21°44.4
5	242°35.2	290°06.1	-17°28.0	199°17.6	17°20.0	340°20.8	-22°37.0	312°37.3	-21°44.4
6	257°37.6	305°05.6	-17°27.3	214°18.4	17°20.6	355°23.0	-22°37.0	327°39.6	-21°44.4
7	272°40.1	320°05.0	-17°26.7	229°19.2	17°21.1	10°25.2	-22°37.0	342°41.9	-21°44.3
8	287°42.5	335°04.4	-17°26.0	244°20.0	17°21.6	25°27.4	-22°37.0	357°44.1	-21°44.3
9	302°45.0	350°03.8	-17°25.4	259°20.8	17°22.1	40°29.6	-22°37.0	12°46.4	-21°44.3
10	317°47.5	5°03.2	-17°24.7	274°21.6	17°22.6	55°31.8	-22°37.1	27°48.6	-21°44.3
11	332°49.9	20°02.6	-17°24.0	289°22.3	17°23.1	70°34.0	-22°37.1	42°50.9	-21°44.2
12	347°52.4	35°02.0	-17°23.4	304°23.1	17°23.6	85°36.3	-22°37.1	57°53.2	-21°44.2
13	2°54.9	50°01.5	-17°22.7	319°23.9	17°24.1	100°38.5	-22°37.1	72°55.4	-21°44.2
14	17°57.3	65°00.9	-17°22.1	334°24.7	17°24.6	115°40.7	-22°37.1	87°57.7	-21°44.2
15	32°59.8	80°00.3	-17°21.4	349°25.5	17°25.1	130°42.9	-22°37.1	102°59.9	-21°44.1
16	48°02.3	94°59.7	-17°20.7	4°26.3	17°25.6	145°45.1	-22°37.1	118°02.2	-21°44.1
17	63°04.7	109°59.1	-17°20.1	19°27.1	17°26.1	160°47.3	-22°37.1	133°04.5	-21°44.1
18	78°07.2	124°58.5	-17°19.4	34°27.9	17°26.6	175°49.5	-22°37.2	148°06.7	-21°44.1
19	93°09.7	139°57.9	-17°18.8	49°28.7	17°27.1	190°51.8	-22°37.2	163°09.0	-21°44.0
20	108°12.1	154°57.4	-17°18.1	64°29.5	17°27.6	205°54.0	-22°37.2	178°11.3	-21°44.0
21	123°14.6	169°56.8	-17°17.4	79°30.3	17°28.1	220°56.2	-22°37.2	193°13.5	-21°44.0
22	138°17.0	184°56.2	-17°16.8	94°31.0	17°28.6	235°58.4	-22°37.2	208°15.8	-21°44.0
23	153°19.5	199°55.6	-17°16.1	109°31.8	17°29.1	251°00.6	-22°37.2	223°18.1	-21°43.9
Mer.pass.:12:48		v-0.6 d0.6 m-3.9		v0.8 d0.5 m1.3		v2.2 d-0.0 m-1.9		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.4
Schedar	349°36.6	56°38.5
Diphda	348°52.2	-17°53.2
Achernar	335°24.3	-57°08.7
Hamal	327°56.6	23°33.0
Polaris	316°18.7	89°20.8
Akamar	315°15.6	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°35.0	49°55.7
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°11.1
Capella	280°28.7	46°01.1
Bellatrix	278°27.8	6°21.8
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.2	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.3	-29°00.2
Procyon	244°55.4	5°10.5
Pollux	243°22.6	27°58.7
Avior	234°16.0	-59°34.5
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.1	-69°47.9
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.3	-63°12.2
Gacrux	171°56.0	-57°13.1
Alioth	166°16.8	55°51.3
Spica	158°26.9	-11°15.6
Alcaid	152°55.4	49°13.0
Hadar	148°41.9	-60°27.6
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.2
Rigil Kent.	139°46.1	-60°54.5
Zubenelg.	137°00.9	-16°07.2
Kochab	137°19.5	74°04.4
Alphecca	126°07.6	26°38.9
Antares	112°21.4	-26°28.3
Atria	107°19.7	-69°03.3
Sabik	102°08.1	-15°44.8
Shaula	96°16.7	-37°06.8
Rasalhague	96°02.9	12°32.7
Etamin	90°44.4	51°29.0
Kaus Aust.	83°38.8	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°53.7	-26°16.2
Altair	62°04.7	8°55.0
Peacock	53°13.5	-56°40.2
Deneb	49°29.2	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.1
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/8	**SHA**	**Mer.pass**
Venus	50°13.1	09:38
Mars	318°10.8	15:45
Jupiter	97°59.4	06:25
Saturn	70°13.1	08:16

2019/3/9	**SHA**	**Mer.pass**
Venus	48°59.6	09:39
Mars	317°30.9	15:44
Jupiter	97°53.0	06:22
Saturn	70°08.1	08:13

2019/3/1	**SHA**	**Mer.pass**
Venus	47°46.2	09:40
Mars	316°50.8	15:42
Jupiter	97°46.9	06:18
Saturn	70°03.2	08:09

Horizontal paralax	
Venus:	0.1
Mars:	0.1

2019 March 08 to Mar. 10

h Fri	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
0	177°15.4	-5°05.1	161°54.7	15.3	-3°34.6	11.0	54.5
1	192°15.6	-5°04.2	176°29.0	15.3	-3°23.6	11.0	54.5
2	207°15.7	-5°03.2	191°03.3	15.3	-3°12.5	11.1	54.5
3	222°15.9	-5°02.2	205°37.6	15.3	-3°01.4	11.1	54.5
4	237°16.0	-5°01.3	220°12.0	15.3	-2°50.3	11.1	54.6
5	252°16.2	-5°00.3	234°46.3	15.3	-2°39.2	11.1	54.6
6	267°16.3	-4°59.3	249°20.6	15.3	-2°28.1	11.1	54.6
7	282°16.5	-4°58.3	263°54.9	15.3	-2°17.0	11.1	54.6
8	297°16.6	-4°57.4	278°29.2	15.3	-2°05.8	11.2	54.6
9	312°16.8	-4°56.4	293°03.5	15.3	-1°54.7	11.2	54.6
10	327°16.9	-4°55.4	307°37.7	15.3	-1°43.5	11.2	54.6
11	342°17.1	-4°54.4	322°12.0	15.3	-1°32.3	11.2	54.6
12	357°17.2	-4°53.5	336°46.3	15.3	-1°21.1	11.2	54.7
13	12°17.4	-4°52.5	351°20.5	15.3	-1°09.9	11.2	54.7
14	27°17.5	-4°51.5	5°54.8	15.2	-0°58.7	11.2	54.7
15	42°17.7	-4°50.5	20°29.0	15.2	-0°47.5	11.2	54.7
16	57°17.8	-4°49.5	35°03.3	15.2	-0°36.2	11.2	54.7
17	72°18.0	-4°48.6	49°37.5	15.2	-0°25.0	11.2	54.7
18	87°18.1	-4°47.6	64°11.7	15.2	-0°13.7	11.3	54.7
19	102°18.3	-4°46.6	78°45.9	15.2	-0°02.5	11.3	54.8
20	117°18.4	-4°45.6	93°20.1	15.2	0°08.8	11.3	54.8
21	132°18.6	-4°44.7	107°54.3	15.2	0°20.0	11.3	54.8
22	147°18.7	-4°43.7	122°28.4	15.1	0°31.3	11.3	54.8
23	162°18.9	-4°42.7	137°02.5	15.1	0°42.6	11.3	54.8
	SD.=16.1	d=1.0			S.D.=14.9		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	177°19.1	-4°41.7	151°36.7	15.1	0°53.9	11.3	54.8
1	192°19.2	-4°40.8	166°10.8	15.1	1°05.2	11.3	54.8
2	207°19.4	-4°39.8	180°44.9	15.1	1°16.4	11.3	54.9
3	222°19.5	-4°38.8	195°18.9	15.1	1°27.7	11.3	54.9
4	237°19.7	-4°37.8	209°53.0	15.0	1°39.0	11.3	54.9
5	252°19.8	-4°36.9	224°27.0	15.0	1°50.3	11.3	54.9
6	267°20.0	-4°35.9	239°01.0	15.0	2°01.6	11.3	54.9
7	282°20.1	-4°34.9	253°35.0	15.0	2°12.9	11.3	54.9
8	297°20.3	-4°33.9	268°09.0	15.0	2°24.1	11.3	55.0
9	312°20.4	-4°32.9	282°42.9	14.9	2°35.4	11.3	55.0
10	327°20.6	-4°32.0	297°16.9	14.9	2°46.7	11.3	55.0
11	342°20.8	-4°31.0	311°50.8	14.9	2°57.9	11.3	55.0
12	357°20.9	-4°30.0	326°24.6	14.9	3°09.2	11.3	55.0
13	12°21.1	-4°29.0	340°58.5	14.8	3°20.5	11.2	55.0
14	27°21.2	-4°28.1	355°32.3	14.8	3°31.7	11.2	55.1
15	42°21.4	-4°27.1	10°06.1	14.8	3°42.9	11.2	55.1
16	57°21.5	-4°26.1	24°39.9	14.8	3°54.2	11.2	55.1
17	72°21.7	-4°25.1	39°13.6	14.7	4°05.4	11.2	55.1
18	87°21.8	-4°24.1	53°47.3	14.7	4°16.6	11.2	55.1
19	102°22.0	-4°23.2	68°21.0	14.7	4°27.8	11.2	55.2
20	117°22.2	-4°22.2	82°54.6	14.6	4°39.0	11.2	55.2
21	132°22.3	-4°21.2	97°28.3	14.6	4°50.1	11.2	55.2
22	147°22.5	-4°20.2	112°01.8	14.6	5°01.3	11.2	55.2
23	162°22.6	-4°19.2	126°35.4	14.5	5°12.4	11.1	55.2
	SD.=16.1	d=1.0			S.D.=15.0		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°22.8	-4°18.3	141°08.9	14.5	5°23.6	11.1	55.2
1	192°22.9	-4°17.3	155°42.4	14.5	5°34.7	11.1	55.3
2	207°23.1	-4°16.3	170°15.8	14.4	5°45.8	11.1	55.3
3	222°23.3	-4°15.3	184°49.2	14.4	5°56.9	11.1	55.3
4	237°23.4	-4°14.4	199°22.6	14.4	6°07.9	11.0	55.3
5	252°23.6	-4°13.4	213°56.0	14.3	6°19.0	11.0	55.3
6	267°23.7	-4°12.4	228°29.2	14.3	6°30.0	11.0	55.4
7	282°23.9	-4°11.4	243°02.5	14.2	6°41.0	11.0	55.4
8	297°24.1	-4°10.4	257°35.7	14.2	6°51.9	11.0	55.4
9	312°24.2	-4°09.5	272°08.9	14.2	7°02.9	10.9	55.4
10	327°24.4	-4°08.5	286°42.0	14.1	7°13.8	10.9	55.4
11	342°24.5	-4°07.5	301°15.1	14.1	7°24.7	10.9	55.5
12	357°24.7	-4°06.5	315°48.2	14.0	7°35.6	10.9	55.5
13	12°24.9	-4°05.5	330°21.2	14.0	7°46.5	10.8	55.5
14	27°25.0	-4°04.6	344°54.1	13.9	7°57.3	10.8	55.5
15	42°25.2	-4°03.6	359°27.0	13.9	8°08.1	10.8	55.5
16	57°25.3	-4°02.6	13°59.9	13.8	8°18.9	10.8	55.6
17	72°25.5	-4°01.6	28°32.7	13.8	8°29.6	10.7	55.6
18	87°25.7	-4°00.6	43°05.5	13.7	8°40.4	10.7	55.6
19	102°25.8	-3°59.7	57°38.2	13.7	8°51.0	10.7	55.6
20	117°26.0	-3°58.7	72°10.9	13.7	9°01.7	10.6	55.6
21	132°26.1	-3°57.7	86°43.5	13.6	9°12.3	10.6	55.7
22	147°26.3	-3°56.7	101°16.1	13.5	9°22.9	10.6	55.7
23	162°26.5	-3°55.7	115°48.6	13.5	9°33.5	10.5	55.7
	SD.=16.1	d=1.0			S.D.=15.1		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	04:30	05:50	06:57	17:27	18:34	19:55
70	04:39	05:51	06:52	17:32	18:32	19:45
68	04:47	05:52	06:47	17:36	18:31	19:37
66	04:53	05:53	06:44	17:39	18:30	19:30
64	04:58	05:54	06:41	17:42	18:29	19:25
62	05:03	05:54	06:38	17:44	18:29	19:20
60	05:06	05:55	06:36	17:47	18:28	19:17
58	05:09	05:55	06:34	17:49	18:28	19:13
56	05:12	05:55	06:32	17:50	18:27	19:11
54	05:14	05:55	06:30	17:52	18:27	19:08
52	05:16	05:55	06:29	17:53	18:27	19:06
50	05:18	05:55	06:27	17:55	18:27	19:04
45	05:21	05:55	06:24	17:58	18:27	19:01
40	05:23	05:55	06:22	18:00	18:27	18:59
35	05:25	05:54	06:19	18:02	18:28	18:57
30	05:26	05:54	06:17	18:04	18:28	18:56
20	05:26	05:52	06:14	18:08	18:30	18:55
10	05:25	05:49	06:11	18:11	18:32	18:56
0	05:23	05:47	06:07	18:14	18:35	18:59
-10	05:18	05:43	06:04	18:17	18:38	19:03
-20	05:12	05:38	06:00	18:21	18:43	19:08
-30	05:04	05:32	05:56	18:25	18:49	19:17
-35	04:58	05:28	05:54	18:27	18:52	19:22
-40	04:51	05:23	05:51	18:30	18:57	19:29
-45	04:42	05:18	05:47	18:33	19:03	19:38
-50	04:31	05:11	05:43	18:37	19:09	19:49
-52	04:26	05:07	05:42	18:39	19:13	19:54
-54	04:20	05:03	05:39	18:41	19:16	20:00
-56	04:13	04:59	05:37	18:43	19:21	20:07
-58	04:05	04:54	05:35	18:45	19:25	20:15
-60	03:55	04:49	05:32	18:48	19:31	20:24

Lat.	Moonrise Fri	Moonrise Sat	Moonrise Sun	Moonset Fri	Moonset Sat	Moonset Sun
72	07:53	07:39	07:24	19:46	21:31	23:22
70	07:50	07:42	07:34	19:46	21:24	23:06
68	07:48	07:45	07:41	19:46	21:18	22:54
66	07:46	07:47	07:48	19:46	21:14	22:44
64	07:44	07:49	07:53	19:46	21:10	22:35
62	07:43	07:50	07:58	19:46	21:06	22:28
60	07:41	07:51	08:02	19:46	21:03	22:22
58	07:40	07:53	08:06	19:46	21:01	22:16
56	07:39	07:54	08:09	19:46	20:58	22:11
54	07:38	07:55	08:12	19:46	20:56	22:07
52	07:37	07:56	08:15	19:46	20:54	22:03
50	07:36	07:56	08:18	19:46	20:52	21:60
45	07:35	07:58	08:23	19:46	20:48	21:52
40	07:33	07:60	08:28	19:46	20:45	21:46
35	07:32	08:01	08:31	19:46	20:43	21:40
30	07:31	08:02	08:35	19:46	20:40	21:35
20	07:29	08:04	08:41	19:46	20:36	21:27
10	07:27	08:06	08:46	19:46	20:32	21:20
0	07:25	08:08	08:52	19:46	20:29	21:13
-10	07:24	08:10	08:57	19:46	20:25	21:06
-20	07:22	08:12	09:02	19:46	20:22	20:59
-30	07:20	08:14	09:09	19:46	20:18	20:51
-35	07:19	08:15	09:12	19:45	20:15	20:46
-40	07:18	08:17	09:16	19:45	20:12	20:41
-45	07:16	08:18	09:21	19:45	20:09	20:35
-50	07:15	08:20	09:27	19:45	20:06	20:27
-52	07:14	08:21	09:30	19:45	20:04	20:24
-54	07:13	08:22	09:33	19:45	20:02	20:20
-56	07:12	08:23	09:36	19:45	19:60	20:16
-58	07:11	08:25	09:40	19:45	19:58	20:12
-60	07:10	08:26	09:44	19:45	19:55	20:07

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
8	10:58	10:51	12:10	13:35	01:14	2(3%)
9	10:44	10:36	12:10	14:18	01:56	3(8%)
10	10:29	10:21	12:10	15:02	02:40	4(14%)

March 11, 12 ,13 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	168°22.0	214°55.0	-17°15.4	124°32.6	17°29.6	266°02.8	-22°37.2	238°20.3	-21°43.9
1	183°24.4	229°54.5	-17°14.8	139°33.4	17°30.1	281°05.1	-22°37.2	253°22.6	-21°43.9
2	198°26.9	244°53.9	-17°14.1	154°34.2	17°30.6	296°07.3	-22°37.2	268°24.8	-21°43.9
3	213°29.4	259°53.3	-17°13.4	169°35.0	17°31.1	311°09.5	-22°37.3	283°27.1	-21°43.8
4	228°31.8	274°52.7	-17°12.7	184°35.8	17°31.6	326°11.7	-22°37.3	298°29.4	-21°43.8
5	243°34.3	289°52.1	-17°12.1	199°36.6	17°32.1	341°13.9	-22°37.3	313°31.6	-21°43.8
6	258°36.8	304°51.6	-17°11.4	214°37.4	17°32.6	356°16.2	-22°37.3	328°33.9	-21°43.8
7	273°39.2	319°51.0	-17°10.7	229°38.2	17°33.1	11°18.4	-22°37.3	343°36.2	-21°43.8
8	288°41.7	334°50.4	-17°10.0	244°38.9	17°33.6	26°20.6	-22°37.3	358°38.4	-21°43.7
9	303°44.2	349°49.8	-17°09.4	259°39.7	17°34.1	41°22.8	-22°37.3	13°40.7	-21°43.7
10	318°46.6	4°49.2	-17°08.7	274°40.5	17°34.6	56°25.0	-22°37.3	28°43.0	-21°43.7
11	333°49.1	19°48.7	-17°08.0	289°41.3	17°35.1	71°27.3	-22°37.3	43°45.2	-21°43.7
12	348°51.5	34°48.1	-17°07.3	304°42.1	17°35.6	86°29.5	-22°37.4	58°47.5	-21°43.6
13	3°54.0	49°47.5	-17°06.7	319°42.9	17°36.1	101°31.7	-22°37.4	73°49.8	-21°43.6
14	18°56.5	64°46.9	-17°06.0	334°43.7	17°36.6	116°33.9	-22°37.4	88°52.0	-21°43.6
15	33°58.9	79°46.3	-17°05.3	349°44.5	17°37.1	131°36.1	-22°37.4	103°54.3	-21°43.6
16	49°01.4	94°45.8	-17°04.6	4°45.3	17°37.6	146°38.4	-22°37.4	118°56.5	-21°43.5
17	64°03.9	109°45.2	-17°03.9	19°46.0	17°38.1	161°40.6	-22°37.4	133°58.8	-21°43.5
18	79°06.3	124°44.6	-17°03.2	34°46.8	17°38.6	176°42.8	-22°37.4	149°01.1	-21°43.5
19	94°08.8	139°44.0	-17°02.6	49°47.6	17°39.1	191°45.0	-22°37.4	164°03.3	-21°43.5
20	109°11.3	154°43.5	-17°01.9	64°48.4	17°39.6	206°47.3	-22°37.4	179°05.6	-21°43.4
21	124°13.7	169°42.9	-17°01.2	79°49.2	17°40.1	221°49.5	-22°37.5	194°07.9	-21°43.4
22	139°16.2	184°42.3	-17°00.5	94°50.0	17°40.6	236°51.7	-22°37.5	209°10.1	-21°43.4
23	154°18.6	199°41.7	-16°59.8	109°50.8	17°41.1	251°53.9	-22°37.5	224°12.4	-21°43.4
Mer.pass.:12:44		v-0.6 d0.7 m-3.9		v0.8 d0.5 m1.3		v2.2 d-0.0 m-1.9		v2.3 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	169°21.1	214°41.2	-16°59.1	124°51.6	17°41.6	266°56.2	-22°37.5	239°14.7	-21°43.3
1	184°23.6	229°40.6	-16°58.4	139°52.3	17°42.1	281°58.4	-22°37.5	254°16.9	-21°43.3
2	199°26.0	244°40.0	-16°57.8	154°53.1	17°42.6	297°00.6	-22°37.5	269°19.2	-21°43.3
3	214°28.5	259°39.4	-16°57.1	169°53.9	17°43.1	312°02.8	-22°37.5	284°21.5	-21°43.3
4	229°31.0	274°38.9	-16°56.4	184°54.7	17°43.6	327°05.1	-22°37.5	299°23.7	-21°43.3
5	244°33.4	289°38.3	-16°55.7	199°55.5	17°44.1	342°07.3	-22°37.5	314°26.0	-21°43.2
6	259°35.9	304°37.7	-16°55.0	214°56.3	17°44.6	357°09.5	-22°37.6	329°28.3	-21°43.2
7	274°38.4	319°37.2	-16°54.3	229°57.1	17°45.1	12°11.7	-22°37.6	344°30.6	-21°43.2
8	289°40.8	334°36.6	-16°53.6	244°57.9	17°45.6	27°14.0	-22°37.6	359°32.8	-21°43.2
9	304°43.3	349°36.0	-16°52.9	259°58.6	17°46.1	42°16.2	-22°37.6	14°35.1	-21°43.1
10	319°45.8	4°35.4	-16°52.2	274°59.4	17°46.6	57°18.4	-22°37.6	29°37.4	-21°43.1
11	334°48.2	19°34.9	-16°51.5	290°00.2	17°47.1	72°20.7	-22°37.6	44°39.6	-21°43.1
12	349°50.7	34°34.3	-16°50.8	305°01.0	17°47.6	87°22.9	-22°37.6	59°41.9	-21°43.1
13	4°53.1	49°33.7	-16°50.1	320°01.8	17°48.0	102°25.1	-22°37.6	74°44.2	-21°43.0
14	19°55.6	64°33.2	-16°49.4	335°02.6	17°48.5	117°27.3	-22°37.6	89°46.4	-21°43.0
15	34°58.1	79°32.6	-16°48.7	350°03.4	17°49.0	132°29.6	-22°37.6	104°48.7	-21°43.0
16	50°00.5	94°32.0	-16°48.0	5°04.1	17°49.5	147°31.8	-22°37.7	119°51.0	-21°43.0
17	65°03.0	109°31.5	-16°47.3	20°04.9	17°50.0	162°34.0	-22°37.7	134°53.2	-21°42.9
18	80°05.5	124°30.9	-16°46.6	35°05.7	17°50.5	177°36.3	-22°37.7	149°55.5	-21°42.9
19	95°07.9	139°30.3	-16°45.9	50°06.5	17°51.0	192°38.5	-22°37.7	164°57.8	-21°42.9
20	110°10.4	154°29.8	-16°45.2	65°07.3	17°51.5	207°40.7	-22°37.7	180°00.0	-21°42.9
21	125°12.9	169°29.2	-16°44.5	80°08.1	17°52.0	222°42.9	-22°37.7	195°02.3	-21°42.9
22	140°15.3	184°28.6	-16°43.8	95°08.9	17°52.5	237°45.2	-22°37.7	210°04.6	-21°42.8
23	155°17.8	199°28.0	-16°43.1	110°09.6	17°53.0	252°47.4	-22°37.7	225°06.9	-21°42.8
Mer.pass.:12:40		v-0.6 d0.7 m-3.9		v0.8 d0.5 m1.3		v2.2 d-0.0 m-1.9		v2.3 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	170°20.3	214°27.5	-16°42.4	125°10.4	17°53.5	267°49.6	-22°37.7	240°09.1	-21°42.8
1	185°22.7	229°26.9	-16°41.6	140°11.2	17°53.9	282°51.9	-22°37.8	255°11.4	-21°42.8
2	200°25.2	244°26.3	-16°40.9	155°12.0	17°54.4	297°54.1	-22°37.8	270°13.7	-21°42.7
3	215°27.6	259°25.8	-16°40.2	170°12.8	17°54.9	312°56.3	-22°37.8	285°15.9	-21°42.7
4	230°30.1	274°25.2	-16°39.5	185°13.6	17°55.4	327°58.6	-22°37.8	300°18.2	-21°42.7
5	245°32.6	289°24.7	-16°38.8	200°14.3	17°55.9	343°00.8	-22°37.8	315°20.5	-21°42.7
6	260°35.0	304°24.1	-16°38.1	215°15.1	17°56.4	358°03.0	-22°37.8	330°22.7	-21°42.6
7	275°37.5	319°23.5	-16°37.4	230°15.9	17°56.9	13°05.3	-22°37.8	345°25.0	-21°42.6
8	290°40.0	334°23.0	-16°36.7	245°16.7	17°57.4	28°07.5	-22°37.8	0°27.3	-21°42.6
9	305°42.4	349°22.4	-16°35.9	260°17.5	17°57.9	43°09.7	-22°37.8	15°29.6	-21°42.6
10	320°44.9	4°21.8	-16°35.2	275°18.3	17°58.3	58°12.0	-22°37.8	30°31.8	-21°42.5
11	335°47.4	19°21.3	-16°34.5	290°19.0	17°58.8	73°14.2	-22°37.9	45°34.1	-21°42.5
12	350°49.8	34°20.7	-16°33.8	305°19.8	17°59.3	88°16.5	-22°37.9	60°36.4	-21°42.5
13	5°52.3	49°20.1	-16°33.1	320°20.6	17°59.8	103°18.7	-22°37.9	75°38.6	-21°42.5
14	20°54.7	64°19.6	-16°32.4	335°21.4	18°00.3	118°20.9	-22°37.9	90°40.9	-21°42.5
15	35°57.2	79°19.0	-16°31.6	350°22.2	18°00.8	133°23.2	-22°37.9	105°43.2	-21°42.4
16	50°59.7	94°18.5	-16°30.9	5°23.0	18°01.3	148°25.4	-22°37.9	120°45.5	-21°42.4
17	66°02.1	109°17.9	-16°30.2	20°23.7	18°01.8	163°27.6	-22°37.9	135°47.7	-21°42.4
18	81°04.6	124°17.3	-16°29.5	35°24.5	18°02.2	178°29.9	-22°37.9	150°50.0	-21°42.4
19	96°07.1	139°16.8	-16°28.7	50°25.3	18°02.7	193°32.1	-22°37.9	165°52.3	-21°42.3
20	111°09.5	154°16.2	-16°28.0	65°26.1	18°03.2	208°34.4	-22°37.9	180°54.6	-21°42.3
21	126°12.0	169°15.7	-16°27.3	80°26.9	18°03.7	223°36.6	-22°38.0	195°56.8	-21°42.3
22	141°14.5	184°15.1	-16°26.6	95°27.7	18°04.2	238°38.8	-22°38.0	210°59.1	-21°42.3
23	156°16.9	199°14.5	-16°25.8	110°28.4	18°04.7	253°41.1	-22°38.0	226°01.4	-21°42.2
Mer.pass.:12:36		v-0.6 d0.7 m-3.9		v0.8 d0.5 m1.3		v2.2 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.4
Schedar	349°36.6	56°38.5
Diphda	348°52.2	-17°53.2
Achernar	335°24.3	-57°08.7
Hamal	327°56.6	23°33.0
Polaris	316°19.8	89°20.8
Akamar	315°15.6	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°35.0	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.3	-8°11.1
Capella	280°28.7	46°01.1
Bellatrix	278°27.8	6°21.8
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.3	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.3	-29°00.2
Procyon	244°55.4	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.0	-59°34.5
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.1	-69°47.9
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.3	-63°12.2
Gacrux	171°56.0	-57°13.1
Alioth	166°16.8	55°51.3
Spica	158°26.9	-11°15.6
Alcaid	152°55.4	49°13.0
Hadar	148°41.9	-60°27.6
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.2
Rigil Kent.	139°46.0	-60°54.5
Zubenelg.	137°00.9	-16°07.2
Kochab	137°19.4	74°04.5
Alphecca	126°07.6	26°38.9
Antares	112°21.4	-26°28.3
Atria	107°19.7	-69°03.3
Sabik	102°08.1	-15°44.8
Shaula	96°16.7	-37°06.8
Rasalhague	96°02.9	12°32.7
Etamin	90°44.4	51°29.0
Kaus Aust.	83°38.7	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°53.6	-26°16.2
Altair	62°04.7	8°55.0
Peacock	53°13.5	-56°40.2
Deneb	49°29.2	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.1
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/1	**SHA**	**Mer.pass**
Venus	46°33.1	09:41
Mars	316°10.7	15:41
Jupiter	97°40.9	06:15
Saturn	69°58.3	08:05

2019/3/1	**SHA**	**Mer.pass**
Venus	45°20.1	09:42
Mars	315°30.4	15:40
Jupiter	97°35.0	06:11
Saturn	69°53.6	08:02

2019/3/1	**SHA**	**Mer.pass**
Venus	44°07.2	09:43
Mars	314°50.2	15:38
Jupiter	97°29.4	06:08
Saturn	69°48.9	07:58

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°26.6	-3°54.7	130°21.1	13.4	9°44.0	10.5	55.7
1	192°26.8	-3°53.8	144°53.5	13.4	9°54.5	10.5	55.8
2	207°26.9	-3°52.8	159°25.9	13.3	10°04.9	10.4	55.8
3	222°27.1	-3°51.8	173°58.2	13.3	10°15.3	10.4	55.8
4	237°27.3	-3°50.8	188°30.5	13.2	10°25.7	10.4	55.8
5	252°27.4	-3°49.8	203°02.7	13.2	10°36.0	10.3	55.8
6	267°27.6	-3°48.9	217°34.8	13.1	10°46.3	10.3	55.9
7	282°27.8	-3°47.9	232°06.9	13.1	10°56.6	10.2	55.9
8	297°27.9	-3°46.9	246°38.9	13.0	11°06.8	10.2	55.9
9	312°28.1	-3°45.9	261°10.9	12.9	11°16.9	10.1	55.9
10	327°28.2	-3°44.9	275°42.8	12.9	11°27.1	10.1	56.0
11	342°28.4	-3°43.9	290°14.7	12.8	11°37.1	10.1	56.0
12	357°28.6	-3°43.0	304°46.4	12.8	11°47.2	10.0	56.0
13	12°28.7	-3°42.0	319°18.2	12.7	11°57.1	10.0	56.0
14	27°28.9	-3°41.0	333°49.8	12.6	12°07.1	9.9	56.1
15	42°29.1	-3°40.0	348°21.5	12.6	12°17.0	9.9	56.1
16	57°29.2	-3°39.0	2°53.0	12.5	12°26.8	9.8	56.1
17	72°29.4	-3°38.1	17°24.5	12.4	12°36.6	9.8	56.1
18	87°29.5	-3°37.1	31°55.9	12.4	12°46.3	9.7	56.2
19	102°29.7	-3°36.1	46°27.2	12.3	12°56.0	9.7	56.2
20	117°29.9	-3°35.1	60°58.5	12.3	13°05.6	9.6	56.2
21	132°30.0	-3°34.1	75°29.8	12.2	13°15.2	9.5	56.2
22	147°30.2	-3°33.1	90°00.9	12.1	13°24.7	9.5	56.3
23	162°30.4	-3°32.2	104°32.0	12.1	13°34.2	9.4	56.3
	SD.=16.1	d=1.0			S.D.=15.2		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°30.5	-3°31.2	119°03.0	12.0	13°43.6	9.4	56.3
1	192°30.7	-3°30.2	133°34.0	11.9	13°52.9	9.3	56.3
2	207°30.9	-3°29.2	148°04.8	11.8	14°02.2	9.3	56.4
3	222°31.0	-3°28.2	162°35.6	11.8	14°11.4	9.2	56.4
4	237°31.2	-3°27.2	177°06.4	11.7	14°20.6	9.1	56.4
5	252°31.4	-3°26.3	191°37.1	11.6	14°29.7	9.1	56.4
6	267°31.5	-3°25.3	206°07.7	11.6	14°38.7	9.0	56.5
7	282°31.7	-3°24.3	220°38.2	11.5	14°47.7	8.9	56.5
8	297°31.9	-3°23.3	235°08.6	11.4	14°56.6	8.9	56.5
9	312°32.0	-3°22.3	249°39.0	11.3	15°05.5	8.8	56.5
10	327°32.2	-3°21.3	264°09.3	11.3	15°14.3	8.7	56.6
11	342°32.3	-3°20.4	278°39.6	11.2	15°23.0	8.7	56.6
12	357°32.5	-3°19.4	293°09.7	11.1	15°31.6	8.6	56.6
13	12°32.7	-3°18.4	307°39.8	11.1	15°40.2	8.5	56.7
14	27°32.8	-3°17.4	322°09.8	11.0	15°48.7	8.5	56.7
15	42°33.0	-3°16.4	336°39.8	10.9	15°57.1	8.4	56.7
16	57°33.2	-3°15.4	351°09.6	10.8	16°05.4	8.3	56.7
17	72°33.3	-3°14.5	5°39.4	10.7	16°13.7	8.2	56.8
18	87°33.5	-3°13.5	20°09.1	10.7	16°21.9	8.2	56.8
19	102°33.7	-3°12.5	34°38.8	10.6	16°30.0	8.1	56.8
20	117°33.9	-3°11.5	49°08.3	10.5	16°38.1	8.0	56.9
21	132°34.0	-3°10.5	63°37.8	10.4	16°46.0	7.9	56.9
22	147°34.2	-3°09.5	78°07.2	10.4	16°53.9	7.8	56.9
23	162°34.4	-3°08.5	92°36.5	10.3	17°01.7	7.8	56.9
	SD.=16.1	d=1.0			S.D.=15.4		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	177°34.5	-3°07.6	107°05.8	10.2	17°09.5	7.7	57.0
1	192°34.7	-3°06.6	121°35.0	10.1	17°17.1	7.6	57.0
2	207°34.9	-3°05.6	136°04.0	10.1	17°24.6	7.5	57.0
3	222°35.0	-3°04.6	150°33.1	10.0	17°32.1	7.4	57.1
4	237°35.2	-3°03.6	165°02.0	9.9	17°39.5	7.3	57.1
5	252°35.4	-3°02.6	179°30.8	9.8	17°46.8	7.3	57.1
6	267°35.5	-3°01.7	193°59.6	9.7	17°54.0	7.2	57.1
7	282°35.7	-3°00.7	208°28.3	9.7	18°01.1	7.1	57.2
8	297°35.9	-2°59.7	222°56.9	9.6	18°08.2	7.0	57.2
9	312°36.0	-2°58.7	237°25.5	9.5	18°15.1	6.9	57.2
10	327°36.2	-2°57.7	251°53.9	9.4	18°21.9	6.8	57.3
11	342°36.4	-2°56.7	266°22.3	9.3	18°28.7	6.7	57.3
12	357°36.5	-2°55.7	280°50.6	9.3	18°35.3	6.6	57.3
13	12°36.7	-2°54.8	295°18.8	9.2	18°41.9	6.5	57.4
14	27°36.9	-2°53.8	309°47.0	9.1	18°48.4	6.4	57.4
15	42°37.1	-2°52.8	324°15.0	9.0	18°54.7	6.3	57.4
16	57°37.2	-2°51.8	338°43.0	8.9	19°01.0	6.2	57.5
17	72°37.4	-2°50.8	353°10.9	8.9	19°07.2	6.1	57.5
18	87°37.6	-2°49.8	7°38.7	8.8	19°13.2	6.0	57.5
19	102°37.7	-2°48.8	22°06.5	8.7	19°19.2	5.9	57.5
20	117°37.9	-2°47.9	36°34.1	8.6	19°25.0	5.8	57.6
21	132°38.1	-2°46.9	51°01.7	8.5	19°30.8	5.7	57.6
22	147°38.2	-2°45.9	65°29.2	8.5	19°36.4	5.6	57.6
23	162°38.4	-2°44.9	79°56.7	8.4	19°42.0	5.5	57.7
	SD.=16.1	d=1.0			S.D.=15.5		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:13	05:34	06:41	17:41	18:48	20:10
70	04:25	05:37	06:38	17:44	18:45	19:58
68	04:34	05:40	06:35	17:47	18:42	19:48
66	04:41	05:42	06:32	17:49	18:40	19:41
64	04:48	05:43	06:30	17:51	18:38	19:34
62	04:53	05:45	06:29	17:53	18:37	19:29
60	04:57	05:46	06:27	17:54	18:35	19:24
58	05:01	05:47	06:25	17:55	18:34	19:20
56	05:04	05:47	06:24	17:57	18:34	19:17
54	05:07	05:48	06:23	17:58	18:33	19:14
52	05:09	05:48	06:22	17:59	18:32	19:12
50	05:11	05:49	06:21	17:60	18:32	19:09
45	05:16	05:50	06:19	18:02	18:31	19:05
40	05:19	05:50	06:17	18:03	18:30	19:02
35	05:21	05:50	06:15	18:05	18:30	18:59
30	05:22	05:50	06:14	18:06	18:30	18:58
20	05:24	05:49	06:11	18:09	18:31	18:56
10	05:24	05:48	06:09	18:11	18:32	18:56
0	05:22	05:46	06:07	18:13	18:34	18:58
-10	05:19	05:43	06:04	18:15	18:36	19:01
-20	05:14	05:39	06:01	18:18	18:40	19:06
-30	05:06	05:34	05:58	18:21	18:45	19:13
-35	05:01	05:31	05:56	18:23	18:48	19:18
-40	04:55	05:27	05:54	18:25	18:52	19:24
-45	04:47	05:22	05:51	18:27	18:57	19:32
-50	04:37	05:16	05:48	18:30	19:03	19:42
-52	04:32	05:13	05:47	18:32	19:06	19:46
-54	04:26	05:09	05:45	18:33	19:09	19:52
-56	04:20	05:06	05:44	18:35	19:12	19:58
-58	04:13	05:02	05:42	18:37	19:16	20:05
-60	04:04	04:57	05:39	18:39	19:21	20:13

Lat.	Moonrise			Moonset		
	Mon	Tue	Wed	Mon	Tue	Wed
72	07:07	06:43	05:43	–:–	01:23	04:07
70	07:25	07:13	06:56	–:–	00:55	02:55
68	07:38	07:36	07:34	–:–	00:33	02:19
66	07:50	07:54	08:01	–:–	00:17	01:53
64	07:60	08:08	08:21	–:–	00:03	01:33
62	08:08	08:20	08:38	23:52	–:–	01:17
60	08:15	08:31	08:52	23:42	–:–	01:03
58	08:21	08:40	09:04	23:34	–:–	00:52
56	08:27	08:48	09:15	23:26	–:–	00:42
54	08:32	08:55	09:24	23:20	–:–	00:33
52	08:36	09:01	09:32	23:14	–:–	00:25
50	08:41	09:07	09:40	23:08	–:–	00:18
45	08:50	09:20	09:56	22:57	–:–	00:03
40	08:57	09:30	10:09	22:47	23:51	–:–
35	09:04	09:39	10:20	22:39	23:40	–:–
30	09:10	09:47	10:30	22:32	23:31	–:–
20	09:20	10:01	10:47	22:20	23:15	–:–
10	09:29	10:13	11:02	22:09	23:01	23:56
0	09:37	10:25	11:16	21:59	22:49	23:41
-10	09:45	10:36	11:30	21:50	22:36	23:26
-20	09:54	10:48	11:45	21:39	22:22	23:10
-30	10:05	11:03	12:02	21:27	22:07	22:52
-35	10:11	11:11	12:12	21:20	21:58	22:41
-40	10:18	11:20	12:24	21:12	21:47	22:29
-45	10:26	11:31	12:38	21:03	21:35	22:14
-50	10:35	11:45	12:55	20:52	21:21	21:57
-52	10:40	11:51	13:03	20:47	21:14	21:48
-54	10:45	11:58	13:11	20:41	21:07	21:39
-56	10:50	12:06	13:21	20:35	20:58	21:29
-58	10:57	12:15	13:33	20:28	20:49	21:17
-60	11:04	12:25	13:46	20:20	20:38	21:03

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
11	10:13	10:06	12:10	15:48	03:24	5(21%)
12	09:58	09:50	12:09	16:36	04:11	6(30%)
13	09:42	09:34	12:09	17:28	05:02	7(40%)

March 14, 15 ,16 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	171°19.4	214°14.0	-16°25.1	125°29.2	18°05.2	268°43.3	-22°38.0	241°03.7	-21°42.2
1	186°21.9	229°13.4	-16°24.4	140°30.0	18°05.6	283°45.6	-22°38.0	256°05.9	-21°42.2
2	201°24.3	244°12.9	-16°23.6	155°30.8	18°06.1	298°47.8	-22°38.0	271°08.2	-21°42.2
3	216°26.8	259°12.3	-16°22.9	170°31.6	18°06.6	313°50.0	-22°38.0	286°10.5	-21°42.2
4	231°29.2	274°11.7	-16°22.2	185°32.3	18°07.1	328°52.3	-22°38.0	301°12.7	-21°42.1
5	246°31.7	289°11.2	-16°21.5	200°33.1	18°07.6	343°54.5	-22°38.0	316°15.0	-21°42.1
6	261°34.2	304°10.6	-16°20.7	215°33.9	18°08.1	358°56.8	-22°38.0	331°17.3	-21°42.1
7	276°36.6	319°10.1	-16°20.0	230°34.7	18°08.5	13°59.0	-22°38.1	346°19.6	-21°42.1
8	291°39.1	334°09.5	-16°19.3	245°35.5	18°09.0	29°01.2	-22°38.1	1°21.8	-21°42.0
9	306°41.6	349°09.0	-16°18.5	260°36.2	18°09.5	44°03.5	-22°38.1	16°24.1	-21°42.0
10	321°44.0	4°08.4	-16°17.8	275°37.0	18°10.0	59°05.7	-22°38.1	31°26.4	-21°42.0
11	336°46.5	19°07.9	-16°17.0	290°37.8	18°10.5	74°08.0	-22°38.1	46°28.7	-21°42.0
12	351°49.0	34°07.3	-16°16.3	305°38.6	18°10.9	89°10.2	-22°38.1	61°30.9	-21°42.0
13	6°51.4	49°06.7	-16°15.6	320°39.4	18°11.4	104°12.5	-22°38.1	76°33.2	-21°41.9
14	21°53.9	64°06.2	-16°14.8	335°40.1	18°11.9	119°14.7	-22°38.1	91°35.5	-21°41.9
15	36°56.4	79°05.6	-16°14.1	350°40.9	18°12.4	134°16.9	-22°38.1	106°37.8	-21°41.9
16	51°58.8	94°05.1	-16°13.4	5°41.7	18°12.9	149°19.2	-22°38.1	121°40.0	-21°41.9
17	67°01.3	109°04.5	-16°12.6	20°42.5	18°13.3	164°21.4	-22°38.1	136°42.3	-21°41.8
18	82°03.7	124°04.0	-16°11.9	35°43.3	18°13.8	179°23.7	-22°38.2	151°44.6	-21°41.8
19	97°06.2	139°03.4	-16°11.1	50°44.0	18°14.3	194°25.9	-22°38.2	166°46.9	-21°41.8
20	112°08.7	154°02.9	-16°10.4	65°44.8	18°14.8	209°28.2	-22°38.2	181°49.2	-21°41.8
21	127°11.1	169°02.3	-16°09.6	80°45.6	18°15.3	224°30.4	-22°38.2	196°51.4	-21°41.7
22	142°13.6	184°01.8	-16°08.9	95°46.4	18°15.7	239°32.7	-22°38.2	211°53.7	-21°41.7
23	157°16.1	199°01.2	-16°08.1	110°47.2	18°16.2	254°34.9	-22°38.2	226°56.0	-21°41.7
Mer.pass.:12:32		v-0.6 d0.7 m-3.9		v0.8 d0.5 m1.3		v2.2 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	172°18.5	214°00.7	-16°07.4	125°47.9	18°16.7	269°37.2	-22°38.2	241°58.3	-21°41.7
1	187°21.0	229°00.1	-16°06.6	140°48.7	18°17.2	284°39.4	-22°38.2	257°00.5	-21°41.7
2	202°23.5	243°59.6	-16°05.9	155°49.5	18°17.7	299°41.6	-22°38.2	272°02.8	-21°41.6
3	217°25.9	258°59.0	-16°05.1	170°50.3	18°18.1	314°43.9	-22°38.2	287°05.1	-21°41.6
4	232°28.4	273°58.5	-16°04.4	185°51.1	18°18.6	329°46.1	-22°38.3	302°07.4	-21°41.6
5	247°30.8	288°57.9	-16°03.6	200°51.8	18°19.1	344°48.4	-22°38.3	317°09.6	-21°41.6
6	262°33.3	303°57.4	-16°02.9	215°52.6	18°19.6	359°50.6	-22°38.3	332°11.9	-21°41.5
7	277°35.8	318°56.8	-16°02.1	230°53.4	18°20.0	14°52.9	-22°38.3	347°14.2	-21°41.5
8	292°38.2	333°56.3	-16°01.4	245°54.2	18°20.5	29°55.1	-22°38.3	2°16.5	-21°41.5
9	307°40.7	348°55.7	-16°00.6	260°54.9	18°21.0	44°57.4	-22°38.3	17°18.8	-21°41.5
10	322°43.2	3°55.2	-15°59.9	275°55.7	18°21.5	59°59.6	-22°38.3	32°21.0	-21°41.5
11	337°45.6	18°54.6	-15°59.1	290°56.5	18°21.9	75°01.9	-22°38.3	47°23.3	-21°41.4
12	352°48.1	33°54.1	-15°58.4	305°57.3	18°22.4	90°04.1	-22°38.3	62°25.6	-21°41.4
13	7°50.6	48°53.5	-15°57.6	320°58.1	18°22.9	105°06.4	-22°38.3	77°27.9	-21°41.4
14	22°53.0	63°53.0	-15°56.9	335°58.8	18°23.4	120°08.6	-22°38.3	92°30.2	-21°41.4
15	37°55.5	78°52.4	-15°56.1	350°59.6	18°23.8	135°10.9	-22°38.4	107°32.4	-21°41.3
16	52°58.0	93°51.9	-15°55.3	6°00.4	18°24.3	150°13.1	-22°38.4	122°34.7	-21°41.3
17	68°00.4	108°51.4	-15°54.6	21°01.2	18°24.8	165°15.4	-22°38.4	137°37.0	-21°41.3
18	83°02.9	123°50.8	-15°53.8	36°01.9	18°25.3	180°17.7	-22°38.4	152°39.3	-21°41.3
19	98°05.3	138°50.3	-15°53.0	51°02.7	18°25.7	195°19.9	-22°38.4	167°41.5	-21°41.2
20	113°07.8	153°49.7	-15°52.3	66°03.5	18°26.2	210°22.2	-22°38.4	182°43.8	-21°41.2
21	128°10.3	168°49.2	-15°51.5	81°04.3	18°26.7	225°24.4	-22°38.4	197°46.1	-21°41.2
22	143°12.7	183°48.6	-15°50.8	96°05.0	18°27.2	240°26.7	-22°38.4	212°48.4	-21°41.2
23	158°15.2	198°48.1	-15°50.0	111°05.8	18°27.6	255°28.9	-22°38.4	227°50.7	-21°41.2
Mer.pass.:12:28		v-0.6 d0.7 m-3.9		v0.8 d0.5 m1.3		v2.2 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	173°17.7	213°47.5	-15°49.2	126°06.6	18°28.1	270°31.2	-22°38.4	242°52.9	-21°41.1
1	188°20.1	228°47.0	-15°48.5	141°07.4	18°28.6	285°33.4	-22°38.4	257°55.2	-21°41.1
2	203°22.6	243°46.5	-15°47.7	156°08.2	18°29.0	300°35.7	-22°38.5	272°57.5	-21°41.1
3	218°25.1	258°45.9	-15°46.9	171°08.9	18°29.5	315°37.9	-22°38.5	287°59.8	-21°41.1
4	233°27.5	273°45.4	-15°46.2	186°09.7	18°30.0	330°40.2	-22°38.5	303°02.1	-21°41.0
5	248°30.0	288°44.8	-15°45.4	201°10.5	18°30.5	345°42.5	-22°38.5	318°04.4	-21°41.0
6	263°32.5	303°44.3	-15°44.6	216°11.3	18°30.9	0°44.7	-22°38.5	333°06.6	-21°41.0
7	278°34.9	318°43.8	-15°43.8	231°12.0	18°31.4	15°47.0	-22°38.5	348°08.9	-21°41.0
8	293°37.4	333°43.2	-15°43.1	246°12.8	18°31.9	30°49.2	-22°38.5	3°11.2	-21°41.0
9	308°39.8	348°42.7	-15°42.3	261°13.6	18°32.3	45°51.5	-22°38.5	18°13.5	-21°40.9
10	323°42.3	3°42.1	-15°41.5	276°14.4	18°32.8	60°53.7	-22°38.5	33°15.8	-21°40.9
11	338°44.8	18°41.6	-15°40.7	291°15.1	18°33.3	75°56.0	-22°38.5	48°18.0	-21°40.9
12	353°47.2	33°41.1	-15°40.0	306°15.9	18°33.7	90°58.3	-22°38.5	63°20.3	-21°40.9
13	8°49.7	48°40.5	-15°39.2	321°16.7	18°34.2	106°00.5	-22°38.5	78°22.6	-21°40.8
14	23°52.2	63°40.0	-15°38.4	336°17.5	18°34.7	121°02.8	-22°38.6	93°24.9	-21°40.8
15	38°54.6	78°39.4	-15°37.6	351°18.2	18°35.1	136°05.0	-22°38.6	108°27.2	-21°40.8
16	53°57.1	93°38.9	-15°36.9	6°19.0	18°35.6	151°07.3	-22°38.6	123°29.5	-21°40.8
17	68°59.6	108°38.4	-15°36.1	21°19.8	18°36.1	166°09.6	-22°38.6	138°31.7	-21°40.8
18	84°02.0	123°37.8	-15°35.3	36°20.6	18°36.5	181°11.8	-22°38.6	153°34.0	-21°40.7
19	99°04.5	138°37.3	-15°34.5	51°21.3	18°37.0	196°14.1	-22°38.6	168°36.3	-21°40.7
20	114°07.0	153°36.8	-15°33.7	66°22.1	18°37.5	211°16.3	-22°38.6	183°38.6	-21°40.7
21	129°09.4	168°36.2	-15°33.0	81°22.9	18°37.9	226°18.6	-22°38.6	198°40.9	-21°40.7
22	144°11.9	183°35.7	-15°32.2	96°23.6	18°38.4	241°20.9	-22°38.6	213°43.2	-21°40.7
23	159°14.3	198°35.2	-15°31.4	111°24.4	18°38.9	256°23.1	-22°38.6	228°45.4	-21°40.6
Mer.pass.:12:24		v-0.5 d0.8 m-3.9		v0.8 d0.5 m1.3		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.4
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.2
Achernar	335°24.3	-57°08.7
Hamal	327°56.6	23°33.0
Polaris	316°20.8	89°20.8
Akamar	315°15.6	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°35.0	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.3	-8°11.1
Capella	280°28.7	46°01.1
Bellatrix	278°27.8	6°21.8
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.3	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.3	-29°00.2
Procyon	244°55.4	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.0	-59°34.5
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.2	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.3	-63°12.2
Gacrux	171°56.0	-57°13.1
Alioth	166°16.8	55°51.3
Spica	158°26.8	-11°15.6
Alcaid	152°55.4	49°13.0
Hadar	148°41.8	-60°27.7
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.2
Rigil Kent.	139°46.0	-60°54.5
Zubenelg.	137°00.9	-16°07.2
Kochab	137°19.4	74°04.5
Alphecca	126°07.5	26°38.9
Antares	112°21.4	-26°28.3
Atria	107°19.6	-69°03.3
Sabik	102°08.0	-15°44.8
Shaula	96°16.6	-37°06.8
Rasalhague	96°02.9	12°32.7
Etamin	90°44.4	51°29.0
Kaus Aust.	83°38.7	-34°22.3
Vega	80°36.5	38°47.9
Nunki	75°53.6	-26°16.2
Altair	62°04.7	8°55.0
Peacock	53°13.5	-56°40.2
Deneb	49°29.2	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.1
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/1	SHA	Mer.pass
Venus	42°54.6	09:43
Mars	314°09.8	15:37
Jupiter	97°23.9	06:04
Saturn	69°44.3	07:55

2019/3/1	SHA	Mer.pass
Venus	41°42.1	09:44
Mars	313°29.4	15:36
Jupiter	97°18.6	06:01
Saturn	69°39.7	07:51

2019/3/1	SHA	Mer.pass
Venus	40°29.9	09:45
Mars	312°48.9	15:35
Jupiter	97°13.5	05:57
Saturn	69°35.3	07:47

Horizontal paralax	
Venus:	0.1
Mars:	0.1

Thu	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
0	177°38.6	-2°43.9	94°24.0	8.3	19°47.4	5.4	57.7
1	192°38.8	-2°42.9	108°51.3	8.2	19°52.7	5.3	57.7
2	207°38.9	-2°41.9	123°18.5	8.2	19°58.0	5.2	57.8
3	222°39.1	-2°41.0	137°45.6	8.1	20°03.1	5.0	57.8
4	237°39.3	-2°40.0	152°12.7	8.0	20°08.1	4.9	57.8
5	252°39.4	-2°39.0	166°39.6	7.9	20°12.9	4.8	57.9
6	267°39.6	-2°38.0	181°06.5	7.9	20°17.7	4.7	57.9
7	282°39.8	-2°37.0	195°33.3	7.8	20°22.4	4.6	57.9
8	297°40.0	-2°36.0	210°00.1	7.7	20°26.9	4.5	58.0
9	312°40.1	-2°35.0	224°26.7	7.6	20°31.3	4.4	58.0
10	327°40.3	-2°34.1	238°53.3	7.6	20°35.6	4.2	58.0
11	342°40.5	-2°33.1	253°19.9	7.5	20°39.8	4.1	58.1
12	357°40.7	-2°32.1	267°46.3	7.4	20°43.9	4.0	58.1
13	12°40.8	-2°31.1	282°12.7	7.3	20°47.8	3.9	58.1
14	27°41.0	-2°30.1	296°39.0	7.3	20°51.6	3.8	58.1
15	42°41.2	-2°29.1	311°05.2	7.2	20°55.3	3.6	58.2
16	57°41.3	-2°28.1	325°31.4	7.1	20°58.9	3.5	58.2
17	72°41.5	-2°27.2	339°57.5	7.1	21°02.3	3.4	58.2
18	87°41.7	-2°26.2	354°23.5	7.0	21°05.7	3.3	58.3
19	102°41.9	-2°25.2	8°49.5	6.9	21°08.9	3.1	58.3
20	117°42.0	-2°24.2	23°15.4	6.9	21°11.9	3.0	58.3
21	132°42.2	-2°23.2	37°41.2	6.8	21°14.9	2.9	58.4
22	147°42.4	-2°22.2	52°07.0	6.7	21°17.7	2.7	58.4
23	162°42.6	-2°21.2	66°32.7	6.7	21°20.4	2.6	58.4
	SD.=16.1	d=1.0			S.D.=15.7		

Fri	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
0	177°42.7	-2°20.2	80°58.3	6.6	21°22.9	2.5	58.5
1	192°42.9	-2°19.3	95°23.9	6.5	21°25.3	2.4	58.5
2	207°43.1	-2°18.3	109°49.4	6.5	21°27.6	2.2	58.5
3	222°43.3	-2°17.3	124°14.8	6.4	21°29.8	2.1	58.6
4	237°43.4	-2°16.3	138°40.2	6.4	21°31.8	2.0	58.6
5	252°43.6	-2°15.3	153°05.5	6.3	21°33.7	1.8	58.6
6	267°43.8	-2°14.3	167°30.8	6.2	21°35.5	1.7	58.7
7	282°43.9	-2°13.3	181°56.0	6.2	21°37.1	1.5	58.7
8	297°44.1	-2°12.4	196°21.2	6.1	21°38.6	1.4	58.7
9	312°44.3	-2°11.4	210°46.3	6.1	21°39.9	1.3	58.8
10	327°44.5	-2°10.4	225°11.3	6.0	21°41.1	1.1	58.8
11	342°44.6	-2°09.4	239°36.3	6.0	21°42.2	1.0	58.8
12	357°44.8	-2°08.4	254°01.3	5.9	21°43.1	0.9	58.9
13	12°45.0	-2°07.4	268°26.1	5.9	21°43.9	0.7	58.9
14	27°45.2	-2°06.4	282°51.0	5.8	21°44.5	0.6	58.9
15	42°45.3	-2°05.4	297°15.8	5.8	21°45.0	0.4	59.0
16	57°45.5	-2°04.5	311°40.5	5.7	21°45.4	0.3	59.0
17	72°45.7	-2°03.5	326°05.3	5.7	21°45.6	0.1	59.0
18	87°45.9	-2°02.5	340°29.9	5.6	21°45.7	0.0	59.1
19	102°46.1	-2°01.5	354°54.5	5.6	21°45.6	-0.1	59.1
20	117°46.2	-2°00.5	9°19.1	5.6	21°45.4	-0.3	59.1
21	132°46.4	-1°59.5	23°43.7	5.5	21°45.1	-0.4	59.2
22	147°46.6	-1°58.5	38°08.1	5.5	21°44.6	-0.6	59.2
23	162°46.8	-1°57.5	52°32.6	5.4	21°43.9	-0.7	59.2
	SD.=16.1	d=1.0			S.D.=16.0		

Sat	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
0	177°46.9	-1°56.6	66°57.0	5.4	21°43.1	-0.9	59.2
1	192°47.1	-1°55.6	81°21.4	5.4	21°42.2	-1.0	59.3
2	207°47.3	-1°54.6	95°45.8	5.3	21°41.1	-1.2	59.3
3	222°47.5	-1°53.6	110°10.1	5.3	21°39.9	-1.3	59.3
4	237°47.6	-1°52.6	124°34.4	5.3	21°38.5	-1.4	59.4
5	252°47.8	-1°51.6	138°58.7	5.3	21°37.0	-1.6	59.4
6	267°48.0	-1°50.6	153°22.9	5.2	21°35.3	-1.7	59.4
7	282°48.2	-1°49.6	167°47.1	5.2	21°33.5	-1.9	59.5
8	297°48.3	-1°48.7	182°11.3	5.2	21°31.5	-2.0	59.5
9	312°48.5	-1°47.7	196°35.5	5.2	21°29.4	-2.2	59.5
10	327°48.7	-1°46.7	210°59.6	5.1	21°27.2	-2.3	59.6
11	342°48.9	-1°45.7	225°23.7	5.1	21°24.7	-2.5	59.6
12	357°49.1	-1°44.7	239°47.8	5.1	21°22.2	-2.6	59.6
13	12°49.2	-1°43.7	254°11.9	5.1	21°19.5	-2.8	59.6
14	27°49.4	-1°42.7	268°36.0	5.1	21°16.6	-2.9	59.7
15	42°49.6	-1°41.7	283°00.0	5.0	21°13.6	-3.1	59.7
16	57°49.8	-1°40.7	297°24.1	5.0	21°10.5	-3.2	59.7
17	72°49.9	-1°39.8	311°48.1	5.0	21°07.2	-3.4	59.8
18	87°50.1	-1°38.8	326°12.1	5.0	21°03.7	-3.5	59.8
19	102°50.3	-1°37.8	340°36.1	5.0	21°00.1	-3.7	59.8
20	117°50.5	-1°36.8	355°00.1	5.0	20°56.4	-3.8	59.9
21	132°50.7	-1°35.8	9°24.1	5.0	20°52.5	-4.0	59.9
22	147°50.8	-1°34.8	23°48.1	5.0	20°48.5	-4.1	59.9
23	162°51.0	-1°33.8	38°12.1	5.0	20°44.3	-4.3	59.9
	SD.=16.1	d=1.0			S.D.=16.2		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	03:55	05:19	06:26	17:55	19:02	20:27
70	04:09	05:23	06:24	17:56	18:57	20:12
68	04:20	05:27	06:22	17:58	18:53	20:01
66	04:29	05:30	06:21	17:59	18:50	19:51
64	04:36	05:33	06:20	17:60	18:47	19:44
62	04:43	05:35	06:19	18:01	18:45	19:37
60	04:48	05:37	06:18	18:01	18:43	19:32
58	04:52	05:38	06:17	18:02	18:41	19:27
56	04:56	05:39	06:16	18:03	18:40	19:24
54	04:59	05:41	06:16	18:03	18:39	19:20
52	05:02	05:42	06:15	18:04	18:38	19:17
50	05:05	05:42	06:15	18:04	18:37	19:14
45	05:10	05:44	06:13	18:05	18:35	19:09
40	05:14	05:45	06:12	18:06	18:33	19:05
35	05:17	05:46	06:11	18:07	18:33	19:02
30	05:19	05:47	06:10	18:08	18:32	18:60
20	05:21	05:47	06:09	18:10	18:32	18:57
10	05:22	05:46	06:07	18:11	18:32	18:56
0	05:21	05:45	06:06	18:12	18:33	18:57
-10	05:19	05:43	06:04	18:14	18:35	18:59
-20	05:15	05:40	06:02	18:15	18:37	19:03
-30	05:08	05:36	06:00	18:17	18:41	19:09
-35	05:04	05:33	05:59	18:19	18:44	19:14
-40	04:58	05:30	05:57	18:20	18:47	19:19
-45	04:51	05:26	05:55	18:22	18:51	19:26
-50	04:42	05:21	05:53	18:24	18:56	19:35
-52	04:38	05:18	05:52	18:25	18:59	19:39
-54	04:33	05:15	05:51	18:26	19:01	19:44
-56	04:27	05:12	05:50	18:27	19:04	19:49
-58	04:21	05:09	05:48	18:28	19:08	19:56
-60	04:13	05:05	05:47	18:30	19:12	20:03

Lat.	Moonrise Thu	Moonrise Fri	Moonrise Sat	Moonset Thu	Moonset Fri	Moonset Sat
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	07:34	07:46	08:52	04:09	05:56	06:53
66	08:15	08:47	09:51	03:29	04:54	05:54
64	08:43	09:22	10:25	03:01	04:20	05:20
62	09:05	09:47	10:50	02:40	03:55	04:55
60	09:23	10:07	11:10	02:22	03:35	04:35
58	09:37	10:24	11:26	02:08	03:19	04:18
56	09:50	10:37	11:39	01:56	03:05	04:05
54	10:01	10:50	11:51	01:45	02:53	03:53
52	10:11	11:00	12:02	01:35	02:42	03:42
50	10:20	11:10	12:11	01:27	02:33	03:32
45	10:38	11:30	12:31	01:09	02:13	03:12
40	10:53	11:46	12:47	00:54	01:57	02:56
35	11:06	11:60	13:01	00:42	01:43	02:42
30	11:18	12:12	13:12	00:31	01:31	02:30
20	11:37	12:33	13:33	00:12	01:11	02:10
10	11:54	12:50	13:50	–:–	00:53	01:52
0	12:10	13:07	14:07	–:–	00:37	01:35
-10	12:26	13:24	14:23	–:–	00:20	01:19
-20	12:43	13:42	14:40	–:–	00:03	01:01
-30	13:03	14:03	15:01	23:43	–:–	00:40
-35	13:14	14:15	15:12	23:31	–:–	00:28
-40	13:27	14:29	15:26	23:17	–:–	00:14
-45	13:43	14:45	15:42	23:01	23:57	–:–
-50	14:03	15:06	16:02	22:41	23:37	–:–
-52	14:12	15:16	16:11	22:32	23:27	–:–
-54	14:22	15:27	16:21	22:21	23:16	–:–
-56	14:34	15:39	16:33	22:09	23:04	–:–
-58	14:47	15:53	16:47	21:56	22:49	23:59
-60	15:03	16:10	17:03	21:39	22:32	23:44

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
14	09:26	09:17	12:09	18:23	05:55	8(51%)
15	09:09	09:01	12:09	19:21	06:51	9(62%)
16	08:52	08:44	12:08	20:20	07:50	10(73%)

March 17, 18 ,19 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	174°16.8	213°34.6	-15°30.6	126°25.2	18°39.3	271°25.4	-22°38.6	243°47.7	-21°40.6
1	189°19.3	228°34.1	-15°29.8	141°26.0	18°39.8	286°27.6	-22°38.7	258°50.0	-21°40.6
2	204°21.7	243°33.5	-15°29.0	156°26.7	18°40.3	301°29.9	-22°38.7	273°52.3	-21°40.6
3	219°24.2	258°33.0	-15°28.2	171°27.5	18°40.7	316°32.2	-22°38.7	288°54.6	-21°40.5
4	234°26.7	273°32.5	-15°27.5	186°28.3	18°41.2	331°34.4	-22°38.7	303°56.9	-21°40.5
5	249°29.1	288°31.9	-15°26.7	201°29.1	18°41.7	346°36.7	-22°38.7	318°59.1	-21°40.5
6	264°31.6	303°31.4	-15°25.9	216°29.8	18°42.1	1°39.0	-22°38.7	334°01.4	-21°40.5
7	279°34.1	318°30.9	-15°25.1	231°30.6	18°42.6	16°41.2	-22°38.7	349°03.7	-21°40.5
8	294°36.5	333°30.4	-15°24.3	246°31.4	18°43.1	31°43.5	-22°38.7	4°06.0	-21°40.4
9	309°39.0	348°29.8	-15°23.5	261°32.2	18°43.5	46°45.8	-22°38.7	19°08.3	-21°40.4
10	324°41.4	3°29.3	-15°22.7	276°32.9	18°44.0	61°48.0	-22°38.7	34°10.6	-21°40.4
11	339°43.9	18°28.8	-15°21.9	291°33.7	18°44.5	76°50.3	-22°38.7	49°12.9	-21°40.4
12	354°46.4	33°28.2	-15°21.1	306°34.5	18°44.9	91°52.5	-22°38.7	64°15.1	-21°40.3
13	9°48.8	48°27.7	-15°20.3	321°35.2	18°45.4	106°54.8	-22°38.8	79°17.4	-21°40.3
14	24°51.3	63°27.2	-15°19.5	336°36.0	18°45.8	121°57.1	-22°38.8	94°19.7	-21°40.3
15	39°53.8	78°26.6	-15°18.7	351°36.8	18°46.3	136°59.3	-22°38.8	109°22.0	-21°40.3
16	54°56.2	93°26.1	-15°17.9	6°37.6	18°46.8	152°01.6	-22°38.8	124°24.3	-21°40.3
17	69°58.7	108°25.6	-15°17.2	21°38.3	18°47.2	167°03.9	-22°38.8	139°26.6	-21°40.2
18	85°01.2	123°25.0	-15°16.4	36°39.1	18°47.7	182°06.1	-22°38.8	154°28.9	-21°40.2
19	100°03.6	138°24.5	-15°15.6	51°39.9	18°48.1	197°08.4	-22°38.8	169°31.1	-21°40.2
20	115°06.1	153°24.0	-15°14.8	66°40.6	18°48.6	212°10.7	-22°38.8	184°33.4	-21°40.2
21	130°08.6	168°23.5	-15°14.0	81°41.4	18°49.1	227°13.0	-22°38.8	199°35.7	-21°40.1
22	145°11.0	183°22.9	-15°13.2	96°42.2	18°49.5	242°15.2	-22°38.8	214°38.0	-21°40.1
23	160°13.5	198°22.4	-15°12.4	111°43.0	18°50.0	257°17.5	-22°38.8	229°40.3	-21°40.1
Mer.pass.:12:20		v-0.5 d0.8 m-3.9		v0.8 d0.5 m1.3		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	175°15.9	213°21.9	-15°11.5	126°43.7	18°50.4	272°19.8	-22°38.8	244°42.6	-21°40.1
1	190°18.4	228°21.4	-15°10.7	141°44.5	18°50.9	287°22.0	-22°38.9	259°44.9	-21°40.1
2	205°20.9	243°20.8	-15°09.9	156°45.3	18°51.4	302°24.3	-22°38.9	274°47.2	-21°40.0
3	220°23.3	258°20.3	-15°09.1	171°46.0	18°51.8	317°26.6	-22°38.9	289°49.4	-21°40.0
4	235°25.8	273°19.8	-15°08.3	186°46.8	18°52.3	332°28.8	-22°38.9	304°51.7	-21°40.0
5	250°28.3	288°19.3	-15°07.5	201°47.6	18°52.7	347°31.1	-22°38.9	319°54.0	-21°40.0
6	265°30.7	303°18.7	-15°06.7	216°48.3	18°53.2	2°33.4	-22°38.9	334°56.3	-21°40.0
7	280°33.2	318°18.2	-15°05.9	231°49.1	18°53.6	17°35.7	-22°38.9	349°58.6	-21°39.9
8	295°35.7	333°17.7	-15°05.1	246°49.9	18°54.1	32°37.9	-22°38.9	5°00.9	-21°39.9
9	310°38.1	348°17.2	-15°04.3	261°50.7	18°54.6	47°40.2	-22°38.9	20°03.2	-21°39.9
10	325°40.6	3°16.6	-15°03.5	276°51.4	18°55.0	62°42.5	-22°38.9	35°05.5	-21°39.9
11	340°43.1	18°16.1	-15°02.7	291°52.2	18°55.5	77°44.7	-22°38.9	50°07.8	-21°39.8
12	355°45.5	33°15.6	-15°01.9	306°53.0	18°55.9	92°47.0	-22°38.9	65°10.0	-21°39.8
13	10°48.0	48°15.1	-15°01.0	321°53.7	18°56.4	107°49.3	-22°38.9	80°12.3	-21°39.8
14	25°50.4	63°14.5	-15°00.2	336°54.5	18°56.8	122°51.6	-22°39.0	95°14.6	-21°39.8
15	40°52.9	78°14.0	-14°59.4	351°55.3	18°57.3	137°53.8	-22°39.0	110°16.9	-21°39.8
16	55°55.4	93°13.5	-14°58.6	6°56.0	18°57.8	152°56.1	-22°39.0	125°19.2	-21°39.7
17	70°57.8	108°13.0	-14°57.8	21°56.8	18°58.2	167°58.4	-22°39.0	140°21.5	-21°39.7
18	86°00.3	123°12.5	-14°57.0	36°57.6	18°58.7	183°00.7	-22°39.0	155°23.8	-21°39.7
19	101°02.8	138°11.9	-14°56.2	51°58.3	18°59.1	198°02.9	-22°39.0	170°26.1	-21°39.7
20	116°05.2	153°11.4	-14°55.3	66°59.1	18°59.6	213°05.2	-22°39.0	185°28.4	-21°39.7
21	131°07.7	168°10.9	-14°54.5	81°59.9	19°00.0	228°07.5	-22°39.0	200°30.7	-21°39.6
22	146°10.2	183°10.4	-14°53.7	97°00.7	19°00.5	243°09.8	-22°39.0	215°32.9	-21°39.6
23	161°12.6	198°09.9	-14°52.9	112°01.4	19°00.9	258°12.1	-22°39.0	230°35.2	-21°39.6
Mer.pass.:12:16		v-0.5 d0.8 m-3.9		v0.8 d0.5 m1.3		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	176°15.1	213°09.3	-14°52.1	127°02.2	19°01.4	273°14.3	-22°39.0	245°37.5	-21°39.6
1	191°17.5	228°08.8	-14°51.2	142°03.0	19°01.8	288°16.6	-22°39.0	260°39.8	-21°39.6
2	206°20.0	243°08.3	-14°50.4	157°03.7	19°02.3	303°18.9	-22°39.0	275°42.1	-21°39.5
3	221°22.5	258°07.8	-14°49.6	172°04.5	19°02.7	318°21.2	-22°39.1	290°44.4	-21°39.5
4	236°24.9	273°07.3	-14°48.8	187°05.3	19°03.2	333°23.4	-22°39.1	305°46.7	-21°39.5
5	251°27.4	288°06.8	-14°47.9	202°06.0	19°03.6	348°25.7	-22°39.1	320°49.0	-21°39.5
6	266°29.9	303°06.2	-14°47.1	217°06.8	19°04.1	3°28.0	-22°39.1	335°51.3	-21°39.4
7	281°32.3	318°05.7	-14°46.3	232°07.6	19°04.5	18°30.3	-22°39.1	350°53.6	-21°39.4
8	296°34.8	333°05.2	-14°45.5	247°08.3	19°05.0	33°32.6	-22°39.1	5°55.9	-21°39.4
9	311°37.3	348°04.7	-14°44.6	262°09.1	19°05.4	48°34.8	-22°39.1	20°58.2	-21°39.4
10	326°39.7	3°04.2	-14°43.8	277°09.9	19°05.9	63°37.1	-22°39.1	36°00.4	-21°39.4
11	341°42.2	18°03.7	-14°43.0	292°10.6	19°06.3	78°39.4	-22°39.1	51°02.7	-21°39.3
12	356°44.7	33°03.1	-14°42.2	307°11.4	19°06.8	93°41.7	-22°39.1	66°05.0	-21°39.3
13	11°47.1	48°02.6	-14°41.3	322°12.2	19°07.2	108°44.0	-22°39.1	81°07.3	-21°39.3
14	26°49.6	63°02.1	-14°40.5	337°12.9	19°07.7	123°46.2	-22°39.1	96°09.6	-21°39.3
15	41°52.0	78°01.6	-14°39.7	352°13.7	19°08.1	138°48.5	-22°39.1	111°11.9	-21°39.3
16	56°54.5	93°01.1	-14°38.8	7°14.5	19°08.6	153°50.8	-22°39.2	126°14.2	-21°39.2
17	71°57.0	108°00.6	-14°38.0	22°15.2	19°09.0	168°53.1	-22°39.2	141°16.5	-21°39.2
18	86°59.4	123°00.1	-14°37.2	37°16.0	19°09.5	183°55.4	-22°39.2	156°18.8	-21°39.2
19	102°01.9	137°59.5	-14°36.3	52°16.8	19°09.9	198°57.7	-22°39.2	171°21.1	-21°39.2
20	117°04.4	152°59.0	-14°35.5	67°17.5	19°10.4	213°59.9	-22°39.2	186°23.4	-21°39.2
21	132°06.8	167°58.5	-14°34.7	82°18.3	19°10.8	229°02.2	-22°39.2	201°25.7	-21°39.1
22	147°09.3	182°58.0	-14°33.8	97°19.1	19°11.3	244°04.5	-22°39.2	216°28.0	-21°39.1
23	162°11.8	197°57.5	-14°33.0	112°19.8	19°11.7	259°06.8	-22°39.2	231°30.3	-21°39.1
Mer.pass.:12:12		v-0.5 d0.8 m-3.9		v0.8 d0.5 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.4
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.2
Achernar	335°24.4	-57°08.7
Hamal	327°56.6	23°33.0
Polaris	316°21.9	89°20.8
Akamar	315°15.6	-40°14.1
Menkar	314°11.1	4°09.6
Mirfak	308°35.0	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.3	-8°11.1
Capella	280°28.7	46°01.1
Bellatrix	278°27.8	6°21.8
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.7
Betelgeuse	270°57.0	7°24.4
Canopus	263°54.3	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.3	-29°00.3
Procyon	244°55.4	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.1	-59°34.6
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.2	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.3	-63°12.2
Gacrux	171°56.0	-57°13.1
Alioth	166°16.7	55°51.3
Spica	158°26.8	-11°15.6
Alcaid	152°55.4	49°13.0
Hadar	148°41.8	-60°27.7
Menkent	148°02.7	-36°27.7
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.9	-60°54.6
Zubenelg.	137°00.9	-16°07.2
Kochab	137°19.3	74°04.5
Alphecca	126°07.5	26°38.9
Antares	112°21.3	-26°28.3
Atria	107°19.5	-69°03.3
Sabik	102°08.0	-15°44.8
Shaula	96°16.6	-37°06.8
Rasalhague	96°02.8	12°32.7
Etamin	90°44.3	51°29.0
Kaus Aust.	83°38.7	-34°22.3
Vega	80°36.4	38°47.9
Nunki	75°53.6	-26°16.2
Altair	62°04.7	8°55.0
Peacock	53°13.4	-56°40.2
Deneb	49°29.1	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.3	-46°52.1
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/1	**SHA**	**Mer.pass**
Venus	39°17.8	09:46
Mars	312°08.4	15:34
Jupiter	97°08.6	05:53
Saturn	69°30.9	07:44

2019/3/1	**SHA**	**Mer.pass**
Venus	38°05.9	09:47
Mars	311°27.8	15:32
Jupiter	97°03.8	05:50
Saturn	69°26.6	07:40

2019/3/1	**SHA**	**Mer.pass**
Venus	36°54.3	09:48
Mars	310°47.1	15:31
Jupiter	96°59.2	05:46
Saturn	69°22.4	07:36

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	177°51.2	-1°32.8	52°36.1	5.0	20°39.9	-4.4	60.0
1	192°51.4	-1°31.9	67°00.1	5.0	20°35.5	-4.6	60.0
2	207°51.6	-1°30.9	81°24.0	5.0	20°30.8	-4.7	60.0
3	222°51.7	-1°29.9	95°48.0	5.0	20°26.1	-4.8	60.0
4	237°51.9	-1°28.9	110°12.0	5.0	20°21.1	-5.0	60.1
5	252°52.1	-1°27.9	124°36.0	5.0	20°16.1	-5.1	60.1
6	267°52.3	-1°26.9	138°60.0	5.0	20°10.9	-5.3	60.1
7	282°52.5	-1°25.9	153°24.0	5.0	20°05.5	-5.4	60.2
8	297°52.6	-1°24.9	167°48.0	5.0	20°00.0	-5.6	60.2
9	312°52.8	-1°24.0	182°12.0	5.0	19°54.4	-5.7	60.2
10	327°53.0	-1°23.0	196°36.1	5.0	19°48.6	-5.9	60.2
11	342°53.2	-1°22.0	211°00.1	5.1	19°42.7	-6.0	60.3
12	357°53.4	-1°21.0	225°24.2	5.1	19°36.6	-6.1	60.3
13	12°53.5	-1°20.0	239°48.3	5.1	19°30.4	-6.3	60.3
14	27°53.7	-1°19.0	254°12.4	5.1	19°24.0	-6.4	60.3
15	42°53.9	-1°18.0	268°36.5	5.1	19°17.5	-6.6	60.3
16	57°54.1	-1°17.0	283°00.6	5.1	19°10.9	-6.7	60.4
17	72°54.3	-1°16.0	297°24.8	5.2	19°04.1	-6.8	60.4
18	87°54.4	-1°15.1	311°48.9	5.2	18°57.2	-7.0	60.4
19	102°54.6	-1°14.1	326°13.1	5.2	18°50.2	-7.1	60.4
20	117°54.8	-1°13.1	340°37.4	5.2	18°43.0	-7.2	60.5
21	132°55.0	-1°12.1	355°01.6	5.3	18°35.7	-7.4	60.5
22	147°55.2	-1°11.1	9°25.9	5.3	18°28.3	-7.5	60.5
23	162°55.3	-1°10.1	23°50.2	5.3	18°20.7	-7.6	60.5
	SD.=16.1	d=1.0			S.D.=16.4		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	177°55.5	-1°09.1	38°14.5	5.3	18°13.0	-7.8	60.5
1	192°55.7	-1°08.1	52°38.8	5.4	18°05.1	-7.9	60.6
2	207°55.9	-1°07.2	67°03.2	5.4	17°57.1	-8.0	60.6
3	222°56.1	-1°06.2	81°27.6	5.4	17°49.0	-8.2	60.6
4	237°56.2	-1°05.2	95°52.1	5.5	17°40.8	-8.3	60.6
5	252°56.4	-1°04.2	110°16.5	5.5	17°32.4	-8.4	60.6
6	267°56.6	-1°03.2	124°41.1	5.5	17°24.0	-8.6	60.7
7	282°56.8	-1°02.2	139°05.6	5.6	17°15.3	-8.7	60.7
8	297°57.0	-1°01.2	153°30.2	5.6	17°06.6	-8.8	60.7
9	312°57.2	-1°00.2	167°54.8	5.6	16°57.7	-8.9	60.7
10	327°57.3	-0°59.2	182°19.4	5.7	16°48.8	-9.0	60.7
11	342°57.5	-0°58.3	196°44.1	5.7	16°39.7	-9.2	60.7
12	357°57.7	-0°57.3	211°08.8	5.7	16°30.4	-9.3	60.8
13	12°57.9	-0°56.3	225°33.6	5.8	16°21.1	-9.4	60.8
14	27°58.1	-0°55.3	239°58.4	5.8	16°11.6	-9.5	60.8
15	42°58.2	-0°54.3	254°23.3	5.9	16°02.0	-9.6	60.8
16	57°58.4	-0°53.3	268°48.1	5.9	15°52.4	-9.7	60.8
17	72°58.6	-0°52.3	283°13.1	5.9	15°42.6	-9.9	60.8
18	87°58.8	-0°51.3	297°38.0	6.0	15°32.6	-10.0	60.8
19	102°59.0	-0°50.4	312°03.0	6.0	15°22.6	-10.1	60.9
20	117°59.2	-0°49.4	326°28.1	6.1	15°12.5	-10.2	60.9
21	132°59.3	-0°48.4	340°53.2	6.1	15°02.2	-10.3	60.9
22	147°59.5	-0°47.4	355°18.3	6.2	14°51.9	-10.4	60.9
23	162°59.7	-0°46.4	9°43.5	6.2	14°41.4	-10.5	60.9
	SD.=16.1	d=1.0			S.D.=16.5		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	177°59.9	-0°45.4	24°08.7	6.3	14°30.9	-10.6	60.9
1	193°00.1	-0°44.4	38°34.0	6.3	14°20.2	-10.7	60.9
2	208°00.3	-0°43.4	52°59.3	6.3	14°09.4	-10.8	60.9
3	223°00.4	-0°42.4	67°24.7	6.4	13°58.6	-10.9	60.9
4	238°00.6	-0°41.5	81°50.1	6.4	13°47.6	-11.0	60.9
5	253°00.8	-0°40.5	96°15.6	6.5	13°36.6	-11.1	61.0
6	268°01.0	-0°39.5	110°41.1	6.5	13°25.4	-11.2	61.0
7	283°01.2	-0°38.5	125°06.6	6.6	13°14.2	-11.3	61.0
8	298°01.4	-0°37.5	139°32.2	6.6	13°02.8	-11.4	61.0
9	313°01.5	-0°36.5	153°57.9	6.7	12°51.4	-11.5	61.0
10	328°01.7	-0°35.5	168°23.6	6.7	12°39.9	-11.6	61.0
11	343°01.9	-0°34.5	182°49.3	6.8	12°28.3	-11.6	61.0
12	358°02.1	-0°33.6	197°15.1	6.8	12°16.6	-11.7	61.0
13	13°02.3	-0°32.6	211°40.9	6.9	12°04.9	-11.8	61.0
14	28°02.5	-0°31.6	226°06.8	6.9	11°53.0	-11.9	61.0
15	43°02.6	-0°30.6	240°32.8	7.0	11°41.1	-12.0	61.0
16	58°02.8	-0°29.6	254°58.7	7.0	11°29.1	-12.0	61.0
17	73°03.0	-0°28.6	269°24.8	7.1	11°17.0	-12.1	61.0
18	88°03.2	-0°27.6	283°50.8	7.1	11°04.8	-12.2	61.0
19	103°03.4	-0°26.6	298°17.0	7.1	10°52.6	-12.3	61.0
20	118°03.6	-0°25.6	312°43.1	7.2	10°40.3	-12.3	61.0
21	133°03.7	-0°24.7	327°09.4	7.2	10°27.9	-12.4	61.0
22	148°03.9	-0°23.7	341°35.6	7.3	10°15.4	-12.5	61.0
23	163°04.1	-0°22.7	356°02.0	7.3	10°02.9	-12.5	61.0
	SD.=16.1	d=1.0			S.D.=16.6		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	03:37	05:03	06:10	18:08	19:16	20:44
70	03:53	05:09	06:10	18:08	19:10	20:27
68	04:06	05:14	06:10	18:09	19:04	20:13
66	04:16	05:19	06:09	18:09	18:60	20:03
64	04:25	05:22	06:09	18:09	18:56	19:54
62	04:32	05:25	06:09	18:09	18:53	19:46
60	04:38	05:27	06:09	18:09	18:50	19:40
58	04:43	05:30	06:09	18:09	18:48	19:35
56	04:48	05:32	06:09	18:09	18:46	19:30
54	04:52	05:33	06:08	18:09	18:44	19:26
52	04:55	05:35	06:08	18:09	18:43	19:22
50	04:58	05:36	06:08	18:09	18:41	19:19
45	05:04	05:39	06:08	18:09	18:39	19:13
40	05:09	05:40	06:07	18:10	18:37	19:08
35	05:13	05:42	06:07	18:10	18:35	19:04
30	05:15	05:43	06:07	18:10	18:34	19:02
20	05:19	05:44	06:06	18:10	18:32	18:58
10	05:20	05:45	06:06	18:11	18:32	18:56
0	05:20	05:44	06:05	18:11	18:32	18:56
-10	05:19	05:43	06:04	18:12	18:33	18:57
-20	05:16	05:41	06:03	18:13	18:35	19:00
-30	05:10	05:38	06:02	18:14	18:38	19:06
-35	05:06	05:36	06:01	18:15	18:40	19:09
-40	05:02	05:33	06:00	18:15	18:42	19:14
-45	04:55	05:30	05:59	18:16	18:45	19:20
-50	04:47	05:26	05:58	18:17	18:50	19:28
-52	04:43	05:24	05:57	18:18	18:52	19:32
-54	04:39	05:21	05:57	18:18	18:54	19:36
-56	04:34	05:19	05:56	18:19	18:56	19:41
-58	04:28	05:16	05:55	18:20	18:59	19:46
-60	04:22	05:12	05:54	18:21	19:02	19:53

Lat.	Moonrise Sun	Moonrise Mon	Moonrise Tue	Moonset Sun	Moonset Mon	Moonset Tue
72	–:–	11:35	14:19	–:–	08:23	07:41
70	09:35	12:23	14:40	08:17	07:34	07:18
68	10:49	12:54	14:57	07:02	07:02	06:60
66	11:26	13:16	15:10	06:24	06:38	06:45
64	11:52	13:34	15:21	05:57	06:19	06:33
62	12:13	13:49	15:30	05:36	06:04	06:23
60	12:29	14:01	15:38	05:19	05:51	06:14
58	12:43	14:12	15:45	05:05	05:40	06:06
56	12:55	14:21	15:51	04:53	05:30	05:59
54	13:06	14:29	15:56	04:42	05:21	05:53
52	13:15	14:36	16:01	04:32	05:13	05:47
50	13:23	14:43	16:05	04:24	05:06	05:42
45	13:41	14:56	16:15	04:05	04:51	05:31
40	13:55	15:08	16:23	03:50	04:39	05:21
35	14:07	15:18	16:30	03:38	04:28	05:14
30	14:18	15:26	16:36	03:27	04:19	05:06
20	14:36	15:41	16:46	03:08	04:03	04:54
10	14:52	15:54	16:55	02:51	03:48	04:43
0	15:07	16:06	17:03	02:35	03:35	04:33
-10	15:21	16:18	17:12	02:19	03:21	04:23
-20	15:37	16:30	17:20	02:02	03:07	04:12
-30	15:55	16:45	17:31	01:43	02:50	03:59
-35	16:05	16:53	17:36	01:32	02:40	03:52
-40	16:17	17:03	17:43	01:18	02:29	03:43
-45	16:31	17:14	17:51	01:03	02:16	03:33
-50	16:49	17:27	17:60	00:44	01:60	03:21
-52	16:57	17:34	18:04	00:35	01:52	03:16
-54	17:05	17:40	18:09	00:24	01:44	03:09
-56	17:15	17:48	18:14	00:13	01:34	03:03
-58	17:27	17:57	18:19	–:–	01:23	02:55
-60	17:40	18:06	18:26	–:–	01:11	02:46

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
17	08:35	08:26	12:08	21:20	08:50	11(82%)
18	08:18	08:09	12:08	22:19	09:50	12(90%)
19	08:00	07:52	12:07	23:16	10:48	13(96%)

March 20, 21 ,22 (Wed., Thu., Fri.)

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	177°14.2	212°57.0	-14°32.2	127°20.6	19°12.2	274°09.1	-22°39.2	246°32.6	-21°39.1
1	192°16.7	227°56.5	-14°31.3	142°21.4	19°12.6	289°11.4	-22°39.2	261°34.9	-21°39.0
2	207°19.2	242°56.0	-14°30.5	157°22.1	19°13.1	304°13.7	-22°39.2	276°37.2	-21°39.0
3	222°21.6	257°55.5	-14°29.6	172°22.9	19°13.5	319°15.9	-22°39.2	291°39.4	-21°39.0
4	237°24.1	272°55.0	-14°28.8	187°23.6	19°14.0	334°18.2	-22°39.2	306°41.7	-21°39.0
5	252°26.5	287°54.4	-14°28.0	202°24.4	19°14.4	349°20.5	-22°39.2	321°44.0	-21°39.0
6	267°29.0	302°53.9	-14°27.1	217°25.2	19°14.8	4°22.8	-22°39.3	336°46.3	-21°38.9
7	282°31.5	317°53.4	-14°26.3	232°25.9	19°15.3	19°25.1	-22°39.3	351°48.6	-21°38.9
8	297°33.9	332°52.9	-14°25.4	247°26.7	19°15.7	34°27.4	-22°39.3	6°50.9	-21°38.9
9	312°36.4	347°52.4	-14°24.6	262°27.5	19°16.2	49°29.7	-22°39.3	21°53.2	-21°38.9
10	327°38.9	2°51.9	-14°23.7	277°28.2	19°16.6	64°31.9	-22°39.3	36°55.5	-21°38.9
11	342°41.3	17°51.4	-14°22.9	292°29.0	19°17.1	79°34.2	-22°39.3	51°57.8	-21°38.8
12	357°43.8	32°50.9	-14°22.0	307°29.8	19°17.5	94°36.5	-22°39.3	67°00.1	-21°38.8
13	12°46.3	47°50.4	-14°21.2	322°30.5	19°17.9	109°38.8	-22°39.3	82°02.4	-21°38.8
14	27°48.7	62°49.9	-14°20.4	337°31.3	19°18.4	124°41.1	-22°39.3	97°04.7	-21°38.8
15	42°51.2	77°49.4	-14°19.5	352°32.1	19°18.8	139°43.4	-22°39.3	112°07.0	-21°38.8
16	57°53.6	92°48.9	-14°18.7	7°32.8	19°19.3	154°45.7	-22°39.3	127°09.3	-21°38.7
17	72°56.1	107°48.4	-14°17.8	22°33.6	19°19.7	169°48.0	-22°39.3	142°11.6	-21°38.7
18	87°58.6	122°47.9	-14°17.0	37°34.3	19°20.2	184°50.3	-22°39.3	157°13.9	-21°38.7
19	103°01.0	137°47.4	-14°16.1	52°35.1	19°20.6	199°52.6	-22°39.3	172°16.2	-21°38.7
20	118°03.5	152°46.9	-14°15.2	67°35.9	19°21.0	214°54.8	-22°39.4	187°18.5	-21°38.7
21	133°06.0	167°46.3	-14°14.4	82°36.6	19°21.5	229°57.1	-22°39.4	202°20.8	-21°38.6
22	148°08.4	182°45.8	-14°13.5	97°37.4	19°21.9	244°59.4	-22°39.4	217°23.1	-21°38.6
23	163°10.9	197°45.3	-14°12.7	112°38.2	19°22.4	260°01.7	-22°39.4	232°25.4	-21°38.6
Mer.pass.:12:09		v-0.5 d0.8 m-3.9		v0.8 d0.4 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	178°13.4	212°44.8	-14°11.8	127°38.9	19°22.8	275°04.0	-22°39.4	247°27.7	-21°38.6
1	193°15.8	227°44.3	-14°11.0	142°39.7	19°23.2	290°06.3	-22°39.4	262°30.0	-21°38.6
2	208°18.3	242°43.8	-14°10.1	157°40.4	19°23.7	305°08.6	-22°39.4	277°32.3	-21°38.5
3	223°20.8	257°43.3	-14°09.3	172°41.2	19°24.1	320°10.9	-22°39.4	292°34.6	-21°38.5
4	238°23.2	272°42.8	-14°08.4	187°42.0	19°24.6	335°13.2	-22°39.4	307°36.9	-21°38.5
5	253°25.7	287°42.3	-14°07.6	202°42.7	19°25.0	350°15.5	-22°39.4	322°39.2	-21°38.5
6	268°28.1	302°41.8	-14°06.7	217°43.5	19°25.4	5°17.8	-22°39.4	337°41.5	-21°38.5
7	283°30.6	317°41.3	-14°05.8	232°44.3	19°25.9	20°20.1	-22°39.4	352°43.8	-21°38.4
8	298°33.1	332°40.8	-14°05.0	247°45.0	19°26.3	35°22.4	-22°39.4	7°46.1	-21°38.4
9	313°35.5	347°40.3	-14°04.1	262°45.8	19°26.7	50°24.7	-22°39.4	22°48.4	-21°38.4
10	328°38.0	2°39.8	-14°03.2	277°46.5	19°27.2	65°27.0	-22°39.4	37°50.7	-21°38.4
11	343°40.5	17°39.3	-14°02.4	292°47.3	19°27.6	80°29.3	-22°39.5	52°53.0	-21°38.4
12	358°42.9	32°38.8	-14°01.5	307°48.1	19°28.1	95°31.6	-22°39.5	67°55.3	-21°38.3
13	13°45.4	47°38.3	-14°00.7	322°48.8	19°28.5	110°33.9	-22°39.5	82°57.6	-21°38.3
14	28°47.9	62°37.8	-13°59.8	337°49.6	19°28.9	125°36.2	-22°39.5	97°59.9	-21°38.3
15	43°50.3	77°37.3	-13°58.9	352°50.3	19°29.4	140°38.4	-22°39.5	113°02.2	-21°38.3
16	58°52.8	92°36.8	-13°58.1	7°51.1	19°29.8	155°40.7	-22°39.5	128°04.5	-21°38.3
17	73°55.2	107°36.3	-13°57.2	22°51.9	19°30.2	170°43.0	-22°39.5	143°06.8	-21°38.2
18	88°57.7	122°35.8	-13°56.3	37°52.6	19°30.7	185°45.3	-22°39.5	158°09.1	-21°38.2
19	104°00.2	137°35.4	-13°55.5	52°53.4	19°31.1	200°47.6	-22°39.5	173°11.4	-21°38.2
20	119°02.6	152°34.9	-13°54.6	67°54.2	19°31.5	215°49.9	-22°39.5	188°13.7	-21°38.2
21	134°05.1	167°34.4	-13°53.7	82°54.9	19°32.0	230°52.2	-22°39.5	203°16.0	-21°38.2
22	149°07.6	182°33.9	-13°52.9	97°55.7	19°32.4	245°54.5	-22°39.5	218°18.3	-21°38.1
23	164°10.0	197°33.4	-13°52.0	112°56.4	19°32.8	260°56.8	-22°39.5	233°20.6	-21°38.1
Mer.pass.:12:05		v-0.5 d0.9 m-3.9		v0.8 d0.4 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	179°12.5	212°32.9	-13°51.1	127°57.2	19°33.3	275°59.1	-22°39.5	248°22.9	-21°38.1
1	194°15.0	227°32.4	-13°50.2	142°58.0	19°33.7	291°01.4	-22°39.5	263°25.2	-21°38.1
2	209°17.4	242°31.9	-13°49.4	157°58.7	19°34.1	306°03.7	-22°39.5	278°27.5	-21°38.1
3	224°19.9	257°31.4	-13°48.5	172°59.5	19°34.6	321°06.0	-22°39.6	293°29.8	-21°38.0
4	239°22.4	272°30.9	-13°47.6	188°00.2	19°35.0	336°08.3	-22°39.6	308°32.1	-21°38.0
5	254°24.8	287°30.4	-13°46.7	203°01.0	19°35.4	351°10.6	-22°39.6	323°34.4	-21°38.0
6	269°27.3	302°29.9	-13°45.9	218°01.7	19°35.9	6°13.0	-22°39.6	338°36.7	-21°38.0
7	284°29.7	317°29.4	-13°45.0	233°02.5	19°36.3	21°15.3	-22°39.6	353°39.0	-21°38.0
8	299°32.2	332°28.9	-13°44.1	248°03.3	19°36.7	36°17.6	-22°39.6	8°41.3	-21°37.9
9	314°34.7	347°28.4	-13°43.2	263°04.0	19°37.2	51°19.9	-22°39.6	23°43.6	-21°37.9
10	329°37.1	2°27.9	-13°42.4	278°04.8	19°37.6	66°22.2	-22°39.6	38°45.9	-21°37.9
11	344°39.6	17°27.5	-13°41.5	293°05.5	19°38.0	81°24.5	-22°39.6	53°48.2	-21°37.9
12	359°42.1	32°27.0	-13°40.6	308°06.3	19°38.4	96°26.8	-22°39.6	68°50.5	-21°37.9
13	14°44.5	47°26.5	-13°39.7	323°07.1	19°38.9	111°29.1	-22°39.6	83°52.8	-21°37.8
14	29°47.0	62°26.0	-13°38.8	338°07.8	19°39.3	126°31.4	-22°39.6	98°55.1	-21°37.8
15	44°49.5	77°25.5	-13°38.0	353°08.6	19°39.7	141°33.7	-22°39.6	113°57.4	-21°37.8
16	59°51.9	92°25.0	-13°37.1	8°09.3	19°40.2	156°36.0	-22°39.6	128°59.7	-21°37.8
17	74°54.4	107°24.5	-13°36.2	23°10.1	19°40.6	171°38.3	-22°39.6	144°02.0	-21°37.8
18	89°56.8	122°24.0	-13°35.3	38°10.9	19°41.0	186°40.6	-22°39.6	159°04.3	-21°37.7
19	104°59.3	137°23.5	-13°34.4	53°11.6	19°41.4	201°42.9	-22°39.7	174°06.7	-21°37.7
20	120°01.8	152°23.1	-13°33.5	68°12.4	19°41.9	216°45.2	-22°39.7	189°09.0	-21°37.7
21	135°04.2	167°22.6	-13°32.7	83°13.1	19°42.3	231°47.5	-22°39.7	204°11.3	-21°37.7
22	150°06.7	182°22.1	-13°31.8	98°13.9	19°42.7	246°49.8	-22°39.7	219°13.6	-21°37.7
23	165°09.2	197°21.6	-13°30.9	113°14.6	19°43.1	261°52.1	-22°39.7	234°15.9	-21°37.6
Mer.pass.:12:01		v-0.5 d0.9 m-3.9		v0.8 d0.4 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.3
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.1
Achernar	335°24.4	-57°08.7
Hamal	327°56.6	23°33.0
Polaris	316°23.1	89°20.8
Akamar	315°15.6	-40°14.1
Menkar	314°11.2	4°09.6
Mirfak	308°35.0	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.3	-8°11.1
Capella	280°28.7	46°01.1
Bellatrix	278°27.8	6°21.8
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.7
Betelgeuse	270°57.1	7°24.4
Canopus	263°54.3	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.3	-29°00.3
Procyon	244°55.4	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.1	-59°34.6
Suhail	222°49.2	-43°30.8
Miaplacidus	221°38.2	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.3	-63°12.2
Gacrux	171°56.0	-57°13.2
Alioth	166°16.7	55°51.3
Spica	158°26.8	-11°15.6
Alcaid	152°55.4	49°13.0
Hadar	148°41.8	-60°27.7
Menkent	148°02.6	-36°27.7
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.9	-60°54.6
Zubenelg.	137°00.8	-16°07.2
Kochab	137°19.3	74°04.5
Alphecca	126°07.5	26°38.9
Antares	112°21.3	-26°28.3
Atria	107°19.5	-69°03.3
Sabik	102°08.0	-15°44.8
Shaula	96°16.6	-37°06.8
Rasalhague	96°02.8	12°32.7
Etamin	90°44.3	51°29.0
Kaus Aust.	83°38.6	-34°22.3
Vega	80°36.4	38°47.8
Nunki	75°53.6	-26°16.2
Altair	62°04.6	8°55.0
Peacock	53°13.4	-56°40.2
Deneb	49°29.1	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.2	-46°52.1
Fomalhaut	15°20.1	-29°31.4
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/2	SHA	Mer.pass
Venus	35°42.8	09:49
Mars	310°06.4	15:30
Jupiter	96°54.9	05:43
Saturn	69°18.3	07:33

2019/3/2	SHA	Mer.pass
Venus	34°31.5	09:49
Mars	309°25.6	15:29
Jupiter	96°50.7	05:39
Saturn	69°14.3	07:29

2019/3/2	SHA	Mer.pass
Venus	33°20.4	09:50
Mars	308°44.7	15:27
Jupiter	96°46.6	05:35
Saturn	69°10.4	07:25

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°04.3	-0°21.7	10°28.3	7.4	9°50.3	-12.6	61.0
1	193°04.5	-0°20.7	24°54.7	7.4	9°37.7	-12.7	61.0
2	208°04.7	-0°19.7	39°21.2	7.5	9°25.0	-12.7	61.0
3	223°04.9	-0°18.7	53°47.7	7.5	9°12.2	-12.8	61.0
4	238°05.0	-0°17.7	68°14.2	7.6	8°59.4	-12.9	61.0
5	253°05.2	-0°16.8	82°40.8	7.6	8°46.5	-12.9	61.0
6	268°05.4	-0°15.8	97°07.5	7.7	8°33.6	-13.0	61.0
7	283°05.6	-0°14.8	111°34.2	7.7	8°20.6	-13.0	61.0
8	298°05.8	-0°13.8	126°00.9	7.8	8°07.6	-13.1	61.0
9	313°06.0	-0°12.8	140°27.7	7.8	7°54.5	-13.1	61.0
10	328°06.1	-0°11.8	154°54.5	7.9	7°41.3	-13.2	61.0
11	343°06.3	-0°10.8	169°21.4	7.9	7°28.1	-13.2	61.0
12	358°06.5	-0°09.8	183°48.3	7.9	7°14.9	-13.3	60.9
13	13°06.7	-0°08.9	198°15.3	8.0	7°01.6	-13.3	60.9
14	28°06.9	-0°07.9	212°42.3	8.0	6°48.3	-13.3	60.9
15	43°07.1	-0°06.9	227°09.3	8.1	6°35.0	-13.4	60.9
16	58°07.3	-0°05.9	241°36.4	8.1	6°21.6	-13.4	60.9
17	73°07.4	-0°04.9	256°03.6	8.2	6°08.1	-13.4	60.9
18	88°07.6	-0°03.9	270°30.7	8.2	5°54.7	-13.5	60.9
19	103°07.8	-0°02.9	284°58.0	8.2	5°41.2	-13.5	60.9
20	118°08.0	-0°01.9	299°25.2	8.3	5°27.7	-13.5	60.9
21	133°08.2	-0°00.9	313°52.5	8.3	5°14.1	-13.6	60.8
22	148°08.4	0°00.0	328°19.9	8.4	5°00.5	-13.6	60.8
23	163°08.6	0°01.0	342°47.3	8.4	4°46.9	-13.6	60.8
	SD.=16.1	d=1.0			S.D.=16.6		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°08.7	0°02.0	357°14.7	8.4	4°33.3	-13.6	60.8
1	193°08.9	0°03.0	11°42.1	8.5	4°19.6	-13.7	60.8
2	208°09.1	0°04.0	26°09.6	8.5	4°06.0	-13.7	60.8
3	223°09.3	0°05.0	40°37.2	8.6	3°52.3	-13.7	60.8
4	238°09.5	0°06.0	55°04.8	8.6	3°38.6	-13.7	60.7
5	253°09.7	0°07.0	69°32.4	8.6	3°24.8	-13.7	60.7
6	268°09.9	0°07.9	84°00.0	8.7	3°11.1	-13.7	60.7
7	283°10.1	0°08.9	98°27.7	8.7	2°57.4	-13.8	60.7
8	298°10.2	0°09.9	112°55.4	8.7	2°43.6	-13.8	60.7
9	313°10.4	0°10.9	127°23.2	8.8	2°29.8	-13.8	60.7
10	328°10.6	0°11.9	141°51.0	8.8	2°16.1	-13.8	60.6
11	343°10.8	0°12.9	156°18.8	8.8	2°02.3	-13.8	60.6
12	358°11.0	0°13.9	170°46.7	8.9	1°48.5	-13.8	60.6
13	13°11.2	0°14.8	185°14.6	8.9	1°34.7	-13.8	60.6
14	28°11.4	0°15.8	199°42.5	8.9	1°20.9	-13.8	60.5
15	43°11.5	0°16.8	214°10.4	9.0	1°07.1	-13.8	60.5
16	58°11.7	0°17.8	228°38.4	9.0	0°53.4	-13.8	60.5
17	73°11.9	0°18.8	243°06.5	9.0	0°39.6	-13.8	60.5
18	88°12.1	0°19.8	257°34.5	9.1	0°25.8	-13.8	60.5
19	103°12.3	0°20.8	272°02.6	9.1	0°12.1	-13.8	60.4
20	118°12.5	0°21.8	286°30.7	9.1	-0°01.7	-13.7	60.4
21	133°12.7	0°22.7	300°58.8	9.1	-0°15.4	-13.7	60.4
22	148°12.9	0°23.7	315°27.0	9.2	-0°29.2	-13.7	60.4
23	163°13.0	0°24.7	329°55.2	9.2	-0°42.9	-13.7	60.3
	SD.=16.1	d=1.0			S.D.=16.6		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°13.2	0°25.7	344°23.4	9.2	-0°56.6	-13.7	60.3
1	193°13.4	0°26.7	358°51.6	9.3	-1°10.2	-13.7	60.3
2	208°13.6	0°27.7	13°19.9	9.3	-1°23.9	-13.7	60.3
3	223°13.8	0°28.7	27°48.2	9.3	-1°37.6	-13.6	60.2
4	238°14.0	0°29.7	42°16.5	9.3	-1°51.2	-13.6	60.2
5	253°14.2	0°30.6	56°44.9	9.4	-2°04.8	-13.6	60.2
6	268°14.3	0°31.6	71°13.2	9.4	-2°18.3	-13.6	60.2
7	283°14.5	0°32.6	85°41.6	9.4	-2°31.9	-13.5	60.1
8	298°14.7	0°33.6	100°10.0	9.4	-2°45.4	-13.5	60.1
9	313°14.9	0°34.6	114°38.4	9.4	-2°58.9	-13.5	60.1
10	328°15.1	0°35.6	129°06.9	9.5	-3°12.3	-13.4	60.0
11	343°15.3	0°36.6	143°35.4	9.5	-3°25.8	-13.4	60.0
12	358°15.5	0°37.5	158°03.9	9.5	-3°39.2	-13.4	60.0
13	13°15.7	0°38.5	172°32.4	9.5	-3°52.5	-13.3	59.9
14	28°15.8	0°39.5	187°00.9	9.5	-4°05.8	-13.3	59.9
15	43°16.0	0°40.5	201°29.4	9.6	-4°19.1	-13.3	59.9
16	58°16.2	0°41.5	215°58.0	9.6	-4°32.4	-13.2	59.9
17	73°16.4	0°42.5	230°26.6	9.6	-4°45.6	-13.2	59.8
18	88°16.6	0°43.5	244°55.2	9.6	-4°58.7	-13.1	59.8
19	103°16.8	0°44.4	259°23.8	9.6	-5°11.8	-13.1	59.8
20	118°17.0	0°45.4	273°52.4	9.6	-5°24.9	-13.0	59.7
21	133°17.2	0°46.4	288°21.1	9.7	-5°37.9	-13.0	59.7
22	148°17.4	0°47.4	302°49.7	9.7	-5°50.9	-13.0	59.7
23	163°17.5	0°48.4	317°18.4	9.7	-6°03.8	-12.9	59.6
	SD.=16.1	d=1.0			S.D.=16.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:17	04:47	05:55	18:22	19:31	21:03
70	03:36	04:55	05:56	18:21	19:22	20:42
68	03:51	05:01	05:57	18:19	19:16	20:26
66	04:03	05:07	05:58	18:18	19:10	20:14
64	04:13	05:11	05:59	18:18	19:05	20:04
62	04:21	05:15	05:59	18:17	19:01	19:55
60	04:28	05:18	05:60	18:16	18:58	19:48
58	04:34	05:21	06:00	18:16	18:55	19:42
56	04:39	05:24	06:01	18:15	18:52	19:37
54	04:44	05:26	06:01	18:15	18:50	19:32
52	04:48	05:28	06:01	18:14	18:48	19:28
50	04:51	05:29	06:02	18:14	18:46	19:24
45	04:58	05:33	06:02	18:13	18:43	19:17
40	05:04	05:36	06:03	18:13	18:40	19:11
35	05:08	05:38	06:03	18:12	18:37	19:07
30	05:12	05:39	06:03	18:12	18:36	19:04
20	05:16	05:42	06:04	18:11	18:33	18:59
10	05:19	05:43	06:04	18:11	18:32	18:56
0	05:19	05:43	06:04	18:11	18:31	18:55
-10	05:19	05:43	06:04	18:10	18:31	18:56
-20	05:16	05:42	06:04	18:10	18:32	18:58
-30	05:12	05:40	06:04	18:10	18:34	19:02
-35	05:09	05:38	06:04	18:10	18:36	19:05
-40	05:05	05:36	06:03	18:10	18:37	19:09
-45	04:59	05:34	06:03	18:11	18:40	19:14
-50	04:52	05:31	06:03	18:11	18:43	19:21
-52	04:49	05:29	06:03	18:11	18:44	19:24
-54	04:45	05:27	06:02	18:11	18:46	19:28
-56	04:41	05:25	06:02	18:11	18:48	19:32
-58	04:36	05:23	06:02	18:11	18:50	19:37
-60	04:30	05:20	06:02	18:12	18:53	19:43

	Moonrise			Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	16:39	18:51	20:59	07:18	07:01	06:44
70	16:48	18:51	20:51	07:07	06:57	06:48
68	16:56	18:51	20:44	06:57	06:54	06:50
66	17:02	18:51	20:38	06:49	06:51	06:53
64	17:07	18:51	20:33	06:42	06:49	06:55
62	17:11	18:51	20:29	06:36	06:47	06:57
60	17:15	18:51	20:25	06:31	06:45	06:58
58	17:19	18:51	20:22	06:26	06:44	06:60
56	17:22	18:51	20:19	06:22	06:42	07:01
54	17:24	18:51	20:16	06:18	06:41	07:02
52	17:27	18:51	20:14	06:15	06:40	07:03
50	17:29	18:51	20:12	06:12	06:39	07:04
45	17:34	18:52	20:08	06:05	06:37	07:06
40	17:38	18:52	20:04	05:60	06:35	07:08
35	17:41	18:52	20:01	05:55	06:33	07:10
30	17:44	18:52	19:58	05:50	06:31	07:11
20	17:50	18:52	19:53	05:43	06:29	07:13
10	17:54	18:52	19:49	05:36	06:26	07:15
0	17:59	18:52	19:45	05:30	06:24	07:17
-10	18:03	18:52	19:41	05:23	06:22	07:19
-20	18:08	18:53	19:37	05:16	06:19	07:21
-30	18:13	18:53	19:32	05:08	06:17	07:23
-35	18:16	18:53	19:29	05:04	06:15	07:25
-40	18:19	18:53	19:26	04:59	06:13	07:26
-45	18:23	18:53	19:23	04:52	06:11	07:28
-50	18:28	18:54	19:19	04:45	06:08	07:30
-52	18:30	18:54	19:17	04:42	06:07	07:31
-54	18:32	18:54	19:15	04:38	06:06	07:32
-56	18:35	18:54	19:13	04:34	06:04	07:33
-58	18:38	18:54	19:10	04:29	06:02	07:34
-60	18:41	18:54	19:07	04:23	06:01	07:36

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
20	07:43	07:34	12:07	00:11	11:44	14(99%)
21	07:25	07:16	12:07	00:11	12:38	15(100%)
22	07:07	06:58	12:06	01:04	13:30	16(97%)

March 23, 24 ,25 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	180°11.6	212°21.1	-13°30.0	128°15.4	19°43.6	276°54.5	-22°39.7	249°18.2	-21°37.6
1	195°14.1	227°20.6	-13°29.1	143°16.2	19°44.0	291°56.8	-22°39.7	264°20.5	-21°37.6
2	210°16.6	242°20.1	-13°28.2	158°16.9	19°44.4	306°59.1	-22°39.7	279°22.8	-21°37.6
3	225°19.0	257°19.6	-13°27.3	173°17.7	19°44.9	322°01.4	-22°39.7	294°25.1	-21°37.6
4	240°21.5	272°19.2	-13°26.4	188°18.4	19°45.3	337°03.7	-22°39.7	309°27.4	-21°37.5
5	255°24.0	287°18.7	-13°25.6	203°19.2	19°45.7	352°06.0	-22°39.7	324°29.7	-21°37.5
6	270°26.4	302°18.2	-13°24.7	218°19.9	19°46.1	7°08.3	-22°39.7	339°32.0	-21°37.5
7	285°28.9	317°17.7	-13°23.8	233°20.7	19°46.6	22°10.6	-22°39.7	354°34.3	-21°37.5
8	300°31.3	332°17.2	-13°22.9	248°21.5	19°47.0	37°12.9	-22°39.7	9°36.6	-21°37.5
9	315°33.8	347°16.7	-13°22.0	263°22.2	19°47.4	52°15.2	-22°39.7	24°38.9	-21°37.4
10	330°36.3	2°16.3	-13°21.1	278°23.0	19°47.8	67°17.6	-22°39.7	39°41.2	-21°37.4
11	345°38.7	17°15.8	-13°20.2	293°23.7	19°48.2	82°19.9	-22°39.7	54°43.6	-21°37.4
12	0°41.2	32°15.3	-13°19.3	308°24.5	19°48.7	97°22.2	-22°39.8	69°45.9	-21°37.4
13	15°43.7	47°14.8	-13°18.4	323°25.2	19°49.1	112°24.5	-22°39.8	84°48.2	-21°37.4
14	30°46.1	62°14.3	-13°17.5	338°26.0	19°49.5	127°26.8	-22°39.8	99°50.5	-21°37.3
15	45°48.6	77°13.8	-13°16.6	353°26.7	19°49.9	142°29.1	-22°39.8	114°52.8	-21°37.3
16	60°51.1	92°13.4	-13°15.7	8°27.5	19°50.4	157°31.4	-22°39.8	129°55.1	-21°37.3
17	75°53.5	107°12.9	-13°14.8	23°28.3	19°50.8	172°33.7	-22°39.8	144°57.4	-21°37.3
18	90°56.0	122°12.4	-13°13.9	38°29.0	19°51.2	187°36.1	-22°39.8	159°59.7	-21°37.3
19	105°58.5	137°11.9	-13°13.0	53°29.8	19°51.6	202°38.4	-22°39.8	175°02.0	-21°37.3
20	121°00.9	152°11.4	-13°12.1	68°30.5	19°52.0	217°40.7	-22°39.8	190°04.3	-21°37.2
21	136°03.4	167°11.0	-13°11.2	83°31.3	19°52.5	232°43.0	-22°39.8	205°06.6	-21°37.2
22	151°05.8	182°10.5	-13°10.3	98°32.0	19°52.9	247°45.3	-22°39.8	220°08.9	-21°37.2
23	166°08.3	197°10.0	-13°09.4	113°32.8	19°53.3	262°47.6	-22°39.8	235°11.3	-21°37.2
Mer.pass.:11:57		v-0.5 d0.9 m-3.9		v0.8 d0.4 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	181°10.8	212°09.5	-13°08.5	128°33.5	19°53.7	277°50.0	-22°39.8	250°13.6	-21°37.2
1	196°13.2	227°09.0	-13°07.6	143°34.3	19°54.1	292°52.3	-22°39.8	265°15.9	-21°37.1
2	211°15.7	242°08.6	-13°06.7	158°35.0	19°54.6	307°54.6	-22°39.8	280°18.2	-21°37.1
3	226°18.2	257°08.1	-13°05.8	173°35.8	19°55.0	322°56.9	-22°39.8	295°20.5	-21°37.1
4	241°20.6	272°07.6	-13°04.9	188°36.6	19°55.4	337°59.2	-22°39.8	310°22.8	-21°37.1
5	256°23.1	287°07.1	-13°04.0	203°37.3	19°55.8	353°01.5	-22°39.8	325°25.1	-21°37.1
6	271°25.6	302°06.7	-13°03.1	218°38.1	19°56.2	8°03.9	-22°39.9	340°27.4	-21°37.0
7	286°28.0	317°06.2	-13°02.2	233°38.8	19°56.7	23°06.2	-22°39.9	355°29.7	-21°37.0
8	301°30.5	332°05.7	-13°01.3	248°39.6	19°57.1	38°08.5	-22°39.9	10°32.0	-21°37.0
9	316°32.9	347°05.2	-13°00.3	263°40.3	19°57.5	53°10.8	-22°39.9	25°34.4	-21°37.0
10	331°35.4	2°04.8	-12°59.4	278°41.1	19°57.9	68°13.1	-22°39.9	40°36.7	-21°37.0
11	346°37.9	17°04.3	-12°58.5	293°41.8	19°58.3	83°15.5	-22°39.9	55°39.0	-21°36.9
12	1°40.3	32°03.8	-12°57.6	308°42.6	19°58.7	98°17.8	-22°39.9	70°41.3	-21°36.9
13	16°42.8	47°03.3	-12°56.7	323°43.3	19°59.2	113°20.1	-22°39.9	85°43.6	-21°36.9
14	31°45.3	62°02.9	-12°55.8	338°44.1	19°59.6	128°22.4	-22°39.9	100°45.9	-21°36.9
15	46°47.7	77°02.4	-12°54.9	353°44.8	19°60.0	143°24.7	-22°39.9	115°48.2	-21°36.9
16	61°50.2	92°01.9	-12°54.0	8°45.6	20°00.4	158°27.1	-22°39.9	130°50.5	-21°36.9
17	76°52.7	107°01.4	-12°53.1	23°46.4	20°00.8	173°29.4	-22°39.9	145°52.8	-21°36.8
18	91°55.1	122°01.0	-12°52.1	38°47.1	20°01.2	188°31.7	-22°39.9	160°55.2	-21°36.8
19	106°57.6	137°00.5	-12°51.2	53°47.9	20°01.6	203°34.0	-22°39.9	175°57.5	-21°36.8
20	122°00.1	152°00.0	-12°50.3	68°48.6	20°02.1	218°36.4	-22°39.9	190°59.8	-21°36.8
21	137°02.5	166°59.5	-12°49.4	83°49.4	20°02.5	233°38.7	-22°39.9	206°02.1	-21°36.8
22	152°05.0	181°59.1	-12°48.5	98°50.1	20°02.9	248°41.0	-22°39.9	221°04.4	-21°36.7
23	167°07.4	196°58.6	-12°47.6	113°50.9	20°03.3	263°43.3	-22°39.9	236°06.7	-21°36.7
Mer.pass.:11:53		v-0.5 d0.9 m-3.9		v0.8 d0.4 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	182°09.9	211°58.1	-12°46.6	128°51.6	20°03.7	278°45.6	-22°40.0	251°09.0	-21°36.7
1	197°12.4	226°57.7	-12°45.7	143°52.4	20°04.1	293°48.0	-22°40.0	266°11.3	-21°36.7
2	212°14.8	241°57.2	-12°44.8	158°53.1	20°04.5	308°50.3	-22°40.0	281°13.7	-21°36.7
3	227°17.3	256°56.7	-12°43.9	173°53.9	20°04.9	323°52.6	-22°40.0	296°16.0	-21°36.6
4	242°19.8	271°56.3	-12°43.0	188°54.6	20°05.4	338°54.9	-22°40.0	311°18.3	-21°36.6
5	257°22.2	286°55.8	-12°42.0	203°55.4	20°05.8	353°57.3	-22°40.0	326°20.6	-21°36.6
6	272°24.7	301°55.3	-12°41.1	218°56.1	20°06.2	8°59.6	-22°40.0	341°22.9	-21°36.6
7	287°27.2	316°54.8	-12°40.2	233°56.9	20°06.6	24°01.9	-22°40.0	356°25.2	-21°36.6
8	302°29.6	331°54.4	-12°39.3	248°57.6	20°07.0	39°04.3	-22°40.0	11°27.5	-21°36.6
9	317°32.1	346°53.9	-12°38.3	263°58.4	20°07.4	54°06.6	-22°40.0	26°29.9	-21°36.5
10	332°34.5	1°53.4	-12°37.4	278°59.1	20°07.8	69°08.9	-22°40.0	41°32.2	-21°36.5
11	347°37.0	16°53.0	-12°36.5	293°59.9	20°08.2	84°11.2	-22°40.0	56°34.5	-21°36.5
12	2°39.5	31°52.5	-12°35.6	309°00.6	20°08.6	99°13.6	-22°40.0	71°36.8	-21°36.5
13	17°41.9	46°52.0	-12°34.6	324°01.4	20°09.0	114°15.9	-22°40.0	86°39.1	-21°36.5
14	32°44.4	61°51.6	-12°33.7	339°02.1	20°09.5	129°18.2	-22°40.0	101°41.4	-21°36.4
15	47°46.9	76°51.1	-12°32.8	354°02.9	20°09.9	144°20.6	-22°40.0	116°43.7	-21°36.4
16	62°49.3	91°50.6	-12°31.9	9°03.6	20°10.3	159°22.9	-22°40.0	131°46.1	-21°36.4
17	77°51.8	106°50.2	-12°30.9	24°04.4	20°10.7	174°25.2	-22°40.0	146°48.4	-21°36.4
18	92°54.3	121°49.7	-12°30.0	39°05.1	20°11.1	189°27.5	-22°40.0	161°50.7	-21°36.4
19	107°56.7	136°49.2	-12°29.1	54°05.9	20°11.5	204°29.9	-22°40.0	176°53.0	-21°36.4
20	122°59.2	151°48.8	-12°28.1	69°06.6	20°11.9	219°32.2	-22°40.1	191°55.3	-21°36.3
21	138°01.7	166°48.3	-12°27.2	84°07.4	20°12.3	234°34.5	-22°40.1	206°57.6	-21°36.3
22	153°04.1	181°47.9	-12°26.3	99°08.1	20°12.7	249°36.9	-22°40.1	221°60.0	-21°36.3
23	168°06.6	196°47.4	-12°25.3	114°08.9	20°13.1	264°39.2	-22°40.1	237°02.3	-21°36.3
Mer.pass.:11:49		v-0.5 d0.9 m-3.9		v0.8 d0.4 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.3
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.1
Achernar	335°24.4	-57°08.7
Hamal	327°56.6	23°33.0
Polaris	316°24.1	89°20.8
Akamar	315°15.6	-40°14.1
Menkar	314°11.2	4°09.6
Mirfak	308°35.0	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.8	46°01.1
Bellatrix	278°27.9	6°21.8
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.7
Betelgeuse	270°57.1	7°24.4
Canopus	263°54.4	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.4	-29°00.3
Procyon	244°55.4	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.1	-59°34.6
Suhail	222°49.3	-43°30.9
Miaplacidus	221°38.3	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.3	-63°12.2
Gacrux	171°56.0	-57°13.2
Alioth	166°16.7	55°51.3
Spica	158°26.8	-11°15.6
Alcaid	152°55.3	49°13.0
Hadar	148°41.8	-60°27.7
Menkent	148°02.6	-36°27.7
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.9	-60°54.6
Zubenelg.	137°00.8	-16°07.2
Kochab	137°19.2	74°04.5
Alphecca	126°07.5	26°38.9
Antares	112°21.3	-26°28.3
Atria	107°19.4	-69°03.3
Sabik	102°08.0	-15°44.8
Shaula	96°16.5	-37°06.8
Rasalhague	96°02.8	12°32.7
Etamin	90°44.3	51°29.0
Kaus Aust.	83°38.6	-34°22.3
Vega	80°36.4	38°47.8
Nunki	75°53.5	-26°16.2
Altair	62°04.6	8°55.0
Peacock	53°13.4	-56°40.2
Deneb	49°29.1	45°20.7
Enif	33°43.6	9°57.6
Alnair	27°39.2	-46°52.1
Fomalhaut	15°20.1	-29°31.3
Scheat	13°50.0	28°11.0
Markab	13°34.8	15°18.3

2019/3/2	SHA	Mer.pass
Venus	32°09.5	09:51
Mars	308°03.8	15:26
Jupiter	96°42.8	05:32
Saturn	69°06.5	07:22

2019/3/2	SHA	Mer.pass
Venus	30°58.8	09:52
Mars	307°22.8	15:25
Jupiter	96°39.2	05:28
Saturn	69°02.8	07:18

2019/3/2	SHA	Mer.pass
Venus	29°48.2	09:52
Mars	306°41.7	15:24
Jupiter	96°35.7	05:24
Saturn	68°59.1	07:14

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°17.7	0°49.4	331°47.1	9.7	-6°16.7	-12.9	59.6
1	193°17.9	0°50.4	346°15.8	9.7	-6°29.5	-12.8	59.6
2	208°18.1	0°51.3	0°44.5	9.7	-6°42.3	-12.7	59.5
3	223°18.3	0°52.3	15°13.2	9.7	-6°55.0	-12.7	59.5
4	238°18.5	0°53.3	29°41.9	9.7	-7°07.7	-12.6	59.5
5	253°18.7	0°54.3	44°10.7	9.7	-7°20.3	-12.6	59.4
6	268°18.9	0°55.3	58°39.4	9.8	-7°32.9	-12.5	59.4
7	283°19.0	0°56.3	73°08.2	9.8	-7°45.4	-12.5	59.3
8	298°19.2	0°57.3	87°37.0	9.8	-7°57.8	-12.4	59.3
9	313°19.4	0°58.2	102°05.8	9.8	-8°10.2	-12.3	59.3
10	328°19.6	0°59.2	116°34.5	9.8	-8°22.5	-12.3	59.2
11	343°19.8	1°00.2	131°03.3	9.8	-8°34.8	-12.2	59.2
12	358°20.0	1°01.2	145°32.2	9.8	-8°46.9	-12.2	59.2
13	13°20.2	1°02.2	160°01.0	9.8	-8°59.1	-12.1	59.1
14	28°20.4	1°03.2	174°29.8	9.8	-9°11.1	-12.0	59.1
15	43°20.6	1°04.2	188°58.6	9.8	-9°23.1	-12.0	59.1
16	58°20.7	1°05.1	203°27.4	9.8	-9°35.0	-11.9	59.0
17	73°20.9	1°06.1	217°56.3	9.8	-9°46.9	-11.8	59.0
18	88°21.1	1°07.1	232°25.1	9.8	-9°58.7	-11.7	58.9
19	103°21.3	1°08.1	246°54.0	9.9	-10°10.4	-11.7	58.9
20	118°21.5	1°09.1	261°22.8	9.9	-10°22.0	-11.6	58.9
21	133°21.7	1°10.1	275°51.7	9.9	-10°33.6	-11.5	58.8
22	148°21.9	1°11.1	290°20.6	9.9	-10°45.0	-11.4	58.8
23	163°22.1	1°12.0	304°49.4	9.9	-10°56.5	-11.4	58.8
	SD.=16.1	d=1.0			S.D.=16.3		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.2	1°13.0	319°18.3	9.9	-11°07.8	-11.3	58.7
1	193°22.4	1°14.0	333°47.2	9.9	-11°19.0	-11.2	58.7
2	208°22.6	1°15.0	348°16.0	9.9	-11°30.2	-11.1	58.6
3	223°22.8	1°16.0	2°44.9	9.9	-11°41.3	-11.1	58.6
4	238°23.0	1°17.0	17°13.8	9.9	-11°52.3	-11.0	58.6
5	253°23.2	1°17.9	31°42.7	9.9	-12°03.3	-10.9	58.5
6	268°23.4	1°18.9	46°11.6	9.9	-12°14.1	-10.8	58.5
7	283°23.6	1°19.9	60°40.4	9.9	-12°24.9	-10.7	58.4
8	298°23.8	1°20.9	75°09.3	9.9	-12°35.6	-10.6	58.4
9	313°23.9	1°21.9	89°38.2	9.9	-12°46.2	-10.6	58.4
10	328°24.1	1°22.9	104°07.1	9.9	-12°56.7	-10.5	58.3
11	343°24.3	1°23.9	118°36.0	9.9	-13°07.2	-10.4	58.3
12	358°24.5	1°24.8	133°04.9	9.9	-13°17.5	-10.3	58.2
13	13°24.7	1°25.8	147°33.8	9.9	-13°27.8	-10.2	58.2
14	28°24.9	1°26.8	162°02.7	9.9	-13°37.9	-10.1	58.2
15	43°25.1	1°27.8	176°31.6	9.9	-13°48.0	-10.0	58.1
16	58°25.3	1°28.8	191°00.5	9.9	-13°58.0	-9.9	58.1
17	73°25.5	1°29.8	205°29.3	9.9	-14°07.9	-9.9	58.1
18	88°25.6	1°30.7	219°58.2	9.9	-14°17.7	-9.8	58.0
19	103°25.8	1°31.7	234°27.1	9.9	-14°27.4	-9.7	58.0
20	118°26.0	1°32.7	248°56.0	9.9	-14°37.1	-9.6	57.9
21	133°26.2	1°33.7	263°24.9	9.9	-14°46.6	-9.5	57.9
22	148°26.4	1°34.7	277°53.8	9.9	-14°56.0	-9.4	57.9
23	163°26.6	1°35.7	292°22.7	9.9	-15°05.4	-9.3	57.8
	SD.=16.0	d=1.0			S.D.=16.0		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°26.8	1°36.6	306°51.6	9.9	-15°14.6	-9.2	57.8
1	193°27.0	1°37.6	321°20.5	9.9	-15°23.8	-9.1	57.7
2	208°27.2	1°38.6	335°49.3	9.9	-15°32.8	-9.0	57.7
3	223°27.3	1°39.6	350°18.2	9.9	-15°41.8	-8.9	57.7
4	238°27.5	1°40.6	4°47.1	9.9	-15°50.6	-8.8	57.6
5	253°27.7	1°41.6	19°16.0	9.9	-15°59.4	-8.7	57.6
6	268°27.9	1°42.5	33°44.9	9.9	-16°08.1	-8.6	57.5
7	283°28.1	1°43.5	48°13.8	9.9	-16°16.6	-8.5	57.5
8	298°28.3	1°44.5	62°42.6	9.9	-16°25.1	-8.4	57.5
9	313°28.5	1°45.5	77°11.5	9.9	-16°33.4	-8.3	57.4
10	328°28.7	1°46.5	91°40.4	9.9	-16°41.7	-8.2	57.4
11	343°28.9	1°47.5	106°09.3	9.9	-16°49.9	-8.1	57.3
12	358°29.0	1°48.4	120°38.2	9.9	-16°57.9	-8.0	57.3
13	13°29.2	1°49.4	135°07.0	9.9	-17°05.9	-7.9	57.3
14	28°29.4	1°50.4	149°35.9	9.9	-17°13.7	-7.8	57.2
15	43°29.6	1°51.4	164°04.8	9.9	-17°21.5	-7.7	57.2
16	58°29.8	1°52.4	178°33.7	9.9	-17°29.1	-7.6	57.2
17	73°30.0	1°53.3	193°02.5	9.9	-17°36.6	-7.5	57.1
18	88°30.2	1°54.3	207°31.4	9.9	-17°44.1	-7.4	57.1
19	103°30.4	1°55.3	222°00.3	9.9	-17°51.4	-7.3	57.0
20	118°30.6	1°56.3	236°29.2	9.9	-17°58.6	-7.2	57.0
21	133°30.8	1°57.3	250°58.1	9.9	-18°05.7	-7.1	57.0
22	148°30.9	1°58.3	265°27.0	9.9	-18°12.7	-7.0	56.9
23	163°31.1	1°59.2	279°55.8	9.9	-18°19.6	-6.8	56.9
	SD.=16.0	d=1.0			S.D.=15.8		

	Twilight					Twilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:55	04:30	05:39	18:36	19:46	21:23
70	03:19	04:40	05:42	18:33	19:35	20:59
68	03:36	04:48	05:45	18:30	19:27	20:40
66	03:50	04:55	05:46	18:28	19:20	20:26
64	04:01	05:00	05:48	18:26	19:14	20:14
62	04:10	05:05	05:49	18:25	19:10	20:05
60	04:18	05:09	05:51	18:23	19:05	19:56
58	04:25	05:12	05:52	18:22	19:02	19:50
56	04:31	05:15	05:53	18:21	18:59	19:44
54	04:36	05:18	05:54	18:20	18:56	19:38
52	04:40	05:21	05:54	18:19	18:53	19:34
50	04:44	05:23	05:55	18:19	18:51	19:30
45	04:53	05:27	05:56	18:17	18:46	19:21
40	04:59	05:31	05:58	18:16	18:43	19:15
35	05:04	05:33	05:59	18:15	18:40	19:10
30	05:08	05:36	05:60	18:14	18:38	19:05
20	05:13	05:39	06:01	18:12	18:34	18:60
10	05:17	05:41	06:02	18:11	18:32	18:56
0	05:18	05:42	06:03	18:10	18:30	18:54
-10	05:19	05:43	06:04	18:09	18:30	18:54
-20	05:17	05:43	06:05	18:08	18:30	18:55
-30	05:14	05:42	06:06	18:07	18:30	18:58
-35	05:11	05:41	06:06	18:06	18:31	19:01
-40	05:08	05:40	06:07	18:06	18:33	19:04
-45	05:03	05:38	06:07	18:05	18:34	19:08
-50	04:57	05:35	06:08	18:04	18:36	19:14
-52	04:55	05:34	06:08	18:04	18:37	19:17
-54	04:51	05:33	06:08	18:04	18:39	19:20
-56	04:47	05:31	06:08	18:03	18:40	19:24
-58	04:43	05:29	06:09	18:03	18:42	19:28
-60	04:38	05:27	06:09	18:02	18:44	19:33

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	23:10	–:–	01:33	06:27	06:05	05:31
70	22:50	–:–	00:53	06:38	06:27	06:12
68	22:35	–:–	00:26	06:47	06:43	06:40
66	22:23	–:–	00:06	06:55	06:57	07:01
64	22:13	23:49	–:–	07:01	07:09	07:19
62	22:04	23:36	–:–	07:07	07:18	07:33
60	21:56	23:24	–:–	07:12	07:27	07:45
58	21:50	23:15	–:–	07:16	07:34	07:55
56	21:44	23:06	–:–	07:20	07:41	08:05
54	21:39	22:59	–:–	07:24	07:47	08:13
52	21:35	22:52	–:–	07:27	07:52	08:20
50	21:30	22:46	23:57	07:30	07:57	08:27
45	21:21	22:33	23:40	07:36	08:07	08:41
40	21:14	22:22	23:27	07:41	08:16	08:53
35	21:08	22:13	23:15	07:46	08:23	09:03
30	21:02	22:05	23:05	07:50	08:30	09:11
20	20:52	21:51	22:48	07:57	08:41	09:27
10	20:44	21:39	22:33	08:03	08:51	09:40
0	20:36	21:28	22:19	08:09	09:01	09:53
-10	20:29	21:17	22:06	08:15	09:10	10:05
-20	20:20	21:05	21:51	08:21	09:21	10:19
-30	20:11	20:52	21:34	08:29	09:32	10:34
-35	20:06	20:44	21:25	08:33	09:39	10:43
-40	19:60	20:35	21:14	08:37	09:47	10:53
-45	19:53	20:25	21:01	08:43	09:56	11:05
-50	19:45	20:13	20:45	08:50	10:07	11:20
-52	19:41	20:07	20:38	08:53	10:12	11:27
-54	19:37	20:01	20:30	08:56	10:17	11:35
-56	19:32	19:54	20:20	08:60	10:23	11:43
-58	19:27	19:47	20:10	09:04	10:30	11:53
-60	19:21	19:38	19:58	09:08	10:38	12:04

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
23	06:49	06:40	12:06	01:56	14:22	17(92%)
24	06:31	06:22	12:06	02:48	15:14	18(85%)
25	06:13	06:04	12:06	03:40	16:05	19(76%)

March 26, 27 ,28 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	183°09.0	211°46.9	-12°24.4	129°09.6	20°13.5	279°41.5	-22°40.1	252°04.6	-21°36.3
1	198°11.5	226°46.5	-12°23.5	144°10.4	20°13.9	294°43.9	-22°40.1	267°06.9	-21°36.2
2	213°14.0	241°46.0	-12°22.5	159°11.1	20°14.3	309°46.2	-22°40.1	282°09.2	-21°36.2
3	228°16.4	256°45.5	-12°21.6	174°11.9	20°14.7	324°48.5	-22°40.1	297°11.5	-21°36.2
4	243°18.9	271°45.1	-12°20.7	189°12.6	20°15.2	339°50.9	-22°40.1	312°13.9	-21°36.2
5	258°21.4	286°44.6	-12°19.7	204°13.4	20°15.6	354°53.2	-22°40.1	327°16.2	-21°36.2
6	273°23.8	301°44.2	-12°18.8	219°14.1	20°16.0	9°55.5	-22°40.1	342°18.5	-21°36.1
7	288°26.3	316°43.7	-12°17.9	234°14.9	20°16.4	24°57.9	-22°40.1	357°20.8	-21°36.1
8	303°28.8	331°43.2	-12°16.9	249°15.6	20°16.8	40°00.2	-22°40.1	12°23.1	-21°36.1
9	318°31.2	346°42.8	-12°16.0	264°16.4	20°17.2	55°02.5	-22°40.1	27°25.5	-21°36.1
10	333°33.7	1°42.3	-12°15.0	279°17.1	20°17.6	70°04.9	-22°40.1	42°27.8	-21°36.1
11	348°36.2	16°41.9	-12°14.1	294°17.9	20°18.0	85°07.2	-22°40.1	57°30.1	-21°36.1
12	3°38.6	31°41.4	-12°13.2	309°18.6	20°18.4	100°09.5	-22°40.1	72°32.4	-21°36.0
13	18°41.1	46°40.9	-12°12.2	324°19.4	20°18.8	115°11.9	-22°40.1	87°34.7	-21°36.0
14	33°43.5	61°40.5	-12°11.3	339°20.1	20°19.2	130°14.2	-22°40.1	102°37.1	-21°36.0
15	48°46.0	76°40.0	-12°10.3	354°20.9	20°19.6	145°16.6	-22°40.1	117°39.4	-21°36.0
16	63°48.5	91°39.6	-12°09.4	9°21.6	20°20.0	160°18.9	-22°40.1	132°41.7	-21°36.0
17	78°50.9	106°39.1	-12°08.4	24°22.4	20°20.4	175°21.2	-22°40.2	147°44.0	-21°36.0
18	93°53.4	121°38.6	-12°07.5	39°23.1	20°20.8	190°23.6	-22°40.2	162°46.3	-21°35.9
19	108°55.9	136°38.2	-12°06.6	54°23.8	20°21.2	205°25.9	-22°40.2	177°48.6	-21°35.9
20	123°58.3	151°37.7	-12°05.6	69°24.6	20°21.6	220°28.2	-22°40.2	192°51.0	-21°35.9
21	139°00.8	166°37.3	-12°04.7	84°25.3	20°22.0	235°30.6	-22°40.2	207°53.3	-21°35.9
22	154°03.3	181°36.8	-12°03.7	99°26.1	20°22.4	250°32.9	-22°40.2	222°55.6	-21°35.9
23	169°05.7	196°36.4	-12°02.8	114°26.8	20°22.8	265°35.3	-22°40.2	237°57.9	-21°35.8
Mer.pass.:11:45		v-0.5 d0.9 m-3.9		v0.7 d0.4 m1.4		v2.3 d-0.0 m-2.0		v2.3 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	184°08.2	211°35.9	-12°01.8	129°27.6	20°23.2	280°37.6	-22°40.2	253°00.3	-21°35.8
1	199°10.7	226°35.5	-12°00.9	144°28.3	20°23.6	295°39.9	-22°40.2	268°02.6	-21°35.8
2	214°13.1	241°35.0	-11°59.9	159°29.1	20°24.0	310°42.3	-22°40.2	283°04.9	-21°35.8
3	229°15.6	256°34.5	-11°59.0	174°29.8	20°24.4	325°44.6	-22°40.2	298°07.2	-21°35.8
4	244°18.0	271°34.1	-11°58.0	189°30.6	20°24.8	340°47.0	-22°40.2	313°09.5	-21°35.8
5	259°20.5	286°33.6	-11°57.1	204°31.3	20°25.2	355°49.3	-22°40.2	328°11.9	-21°35.7
6	274°23.0	301°33.2	-11°56.1	219°32.1	20°25.6	10°51.7	-22°40.2	343°14.2	-21°35.7
7	289°25.4	316°32.7	-11°55.2	234°32.8	20°26.0	25°54.0	-22°40.2	358°16.5	-21°35.7
8	304°27.9	331°32.3	-11°54.2	249°33.5	20°26.4	40°56.3	-22°40.2	13°18.8	-21°35.7
9	319°30.4	346°31.8	-11°53.3	264°34.3	20°26.8	55°58.7	-22°40.2	28°21.1	-21°35.7
10	334°32.8	1°31.4	-11°52.3	279°35.0	20°27.2	71°01.0	-22°40.2	43°23.5	-21°35.7
11	349°35.3	16°30.9	-11°51.4	294°35.8	20°27.6	86°03.4	-22°40.2	58°25.8	-21°35.6
12	4°37.8	31°30.5	-11°50.4	309°36.5	20°28.0	101°05.7	-22°40.2	73°28.1	-21°35.6
13	19°40.2	46°30.0	-11°49.4	324°37.3	20°28.3	116°08.1	-22°40.2	88°30.4	-21°35.6
14	34°42.7	61°29.6	-11°48.5	339°38.0	20°28.7	131°10.4	-22°40.2	103°32.8	-21°35.6
15	49°45.1	76°29.1	-11°47.5	354°38.8	20°29.1	146°12.8	-22°40.2	118°35.1	-21°35.6
16	64°47.6	91°28.7	-11°46.6	9°39.5	20°29.5	161°15.1	-22°40.3	133°37.4	-21°35.5
17	79°50.1	106°28.2	-11°45.6	24°40.3	20°29.9	176°17.4	-22°40.3	148°39.7	-21°35.5
18	94°52.5	121°27.8	-11°44.7	39°41.0	20°30.3	191°19.8	-22°40.3	163°42.1	-21°35.5
19	109°55.0	136°27.3	-11°43.7	54°41.7	20°30.7	206°22.1	-22°40.3	178°44.4	-21°35.5
20	124°57.5	151°26.9	-11°42.7	69°42.5	20°31.1	221°24.5	-22°40.3	193°46.7	-21°35.5
21	139°59.9	166°26.4	-11°41.8	84°43.2	20°31.5	236°26.8	-22°40.3	208°49.0	-21°35.5
22	155°02.4	181°26.0	-11°40.8	99°44.0	20°31.9	251°29.2	-22°40.3	223°51.3	-21°35.4
23	170°04.9	196°25.5	-11°39.9	114°44.7	20°32.3	266°31.5	-22°40.3	238°53.7	-21°35.4
Mer.pass.:11:41		v-0.5 d0.9 m-3.9		v0.7 d0.4 m1.4		v2.3 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	185°07.3	211°25.1	-11°38.9	129°45.5	20°32.7	281°33.9	-22°40.3	253°56.0	-21°35.4
1	200°09.8	226°24.6	-11°37.9	144°46.2	20°33.1	296°36.2	-22°40.3	268°58.3	-21°35.4
2	215°12.3	241°24.2	-11°37.0	159°47.0	20°33.5	311°38.6	-22°40.3	284°00.6	-21°35.4
3	230°14.7	256°23.7	-11°36.0	174°47.7	20°33.9	326°40.9	-22°40.3	299°03.0	-21°35.4
4	245°17.2	271°23.3	-11°35.0	189°48.4	20°34.2	341°43.3	-22°40.3	314°05.3	-21°35.3
5	260°19.6	286°22.8	-11°34.1	204°49.2	20°34.6	356°45.6	-22°40.3	329°07.6	-21°35.3
6	275°22.1	301°22.4	-11°33.1	219°49.9	20°35.0	11°48.0	-22°40.3	344°09.9	-21°35.3
7	290°24.6	316°21.9	-11°32.2	234°50.7	20°35.4	26°50.3	-22°40.3	359°12.3	-21°35.3
8	305°27.0	331°21.5	-11°31.2	249°51.4	20°35.8	41°52.7	-22°40.3	14°14.6	-21°35.3
9	320°29.5	346°21.1	-11°30.2	264°52.2	20°36.2	56°55.0	-22°40.3	29°16.9	-21°35.3
10	335°32.0	1°20.6	-11°29.3	279°52.9	20°36.6	71°57.4	-22°40.3	44°19.3	-21°35.2
11	350°34.4	16°20.2	-11°28.3	294°53.6	20°37.0	86°59.7	-22°40.3	59°21.6	-21°35.2
12	5°36.9	31°19.7	-11°27.3	309°54.4	20°37.4	102°02.1	-22°40.3	74°23.9	-21°35.2
13	20°39.4	46°19.3	-11°26.3	324°55.1	20°37.7	117°04.4	-22°40.3	89°26.2	-21°35.2
14	35°41.8	61°18.8	-11°25.4	339°55.9	20°38.1	132°06.8	-22°40.3	104°28.6	-21°35.2
15	50°44.3	76°18.4	-11°24.4	354°56.6	20°38.5	147°09.2	-22°40.3	119°30.9	-21°35.1
16	65°46.8	91°17.9	-11°23.4	9°57.4	20°38.9	162°11.5	-22°40.4	134°33.2	-21°35.1
17	80°49.2	106°17.5	-11°22.5	24°58.1	20°39.3	177°13.9	-22°40.4	149°35.5	-21°35.1
18	95°51.7	121°17.1	-11°21.5	39°58.8	20°39.7	192°16.2	-22°40.4	164°37.9	-21°35.1
19	110°54.1	136°16.6	-11°20.5	54°59.6	20°40.1	207°18.6	-22°40.4	179°40.2	-21°35.1
20	125°56.6	151°16.2	-11°19.5	70°00.3	20°40.5	222°20.9	-22°40.4	194°42.5	-21°35.1
21	140°59.1	166°15.7	-11°18.6	85°01.1	20°40.8	237°23.3	-22°40.4	209°44.9	-21°35.0
22	156°01.5	181°15.3	-11°17.6	100°01.8	20°41.2	252°25.6	-22°40.4	224°47.2	-21°35.0
23	171°04.0	196°14.9	-11°16.6	115°02.5	20°41.6	267°28.0	-22°40.4	239°49.5	-21°35.0
Mer.pass.:11:37		v-0.4 d1.0 m-3.9		v0.7 d0.4 m1.4		v2.3 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.3
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.1
Achernar	335°24.4	-57°08.6
Hamal	327°56.7	23°33.0
Polaris	316°24.9	89°20.8
Akamar	315°15.7	-40°14.1
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.8	46°01.1
Bellatrix	278°27.9	6°21.8
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.7
Betelgeuse	270°57.1	7°24.4
Canopus	263°54.4	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.4	-29°00.3
Procyon	244°55.4	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.1	-59°34.6
Suhail	222°49.3	-43°30.9
Miaplacidus	221°38.3	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.2	-63°12.3
Gacrux	171°56.0	-57°13.2
Alioth	166°16.7	55°51.3
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.0
Hadar	148°41.7	-60°27.7
Menkent	148°02.6	-36°27.7
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.9	-60°54.6
Zubenelg.	137°00.8	-16°07.2
Kochab	137°19.2	74°04.5
Alphecca	126°07.5	26°39.0
Antares	112°21.3	-26°28.3
Atria	107°19.4	-69°03.3
Sabik	102°07.9	-15°44.8
Shaula	96°16.5	-37°06.8
Rasalhague	96°02.8	12°32.7
Etamin	90°44.3	51°29.0
Kaus Aust.	83°38.6	-34°22.3
Vega	80°36.4	38°47.8
Nunki	75°53.5	-26°16.2
Altair	62°04.6	8°55.0
Peacock	53°13.4	-56°40.2
Deneb	49°29.1	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.2	-46°52.0
Fomalhaut	15°20.1	-29°31.3
Scheat	13°49.9	28°11.0
Markab	13°34.7	15°18.3

2019/3/2	**SHA**	**Mer.pass**
Venus	28°37.9	09:53
Mars	306°00.6	15:23
Jupiter	96°32.5	05:20
Saturn	68°55.5	07:11

2019/3/2	**SHA**	**Mer.pass**
Venus	27°27.7	09:54
Mars	305°19.4	15:21
Jupiter	96°29.4	05:17
Saturn	68°52.1	07:07

2019/3/2	**SHA**	**Mer.pass**
Venus	26°17.7	09:55
Mars	304°38.1	15:20
Jupiter	96°26.6	05:13
Saturn	68°48.7	07:03

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°31.3	2°00.2	294°24.7	9.9	-18°26.4	-6.7	56.9
1	193°31.5	2°01.2	308°53.6	9.9	-18°33.1	-6.6	56.8
2	208°31.7	2°02.2	323°22.5	9.9	-18°39.7	-6.5	56.8
3	223°31.9	2°03.2	337°51.4	9.9	-18°46.2	-6.4	56.7
4	238°32.1	2°04.1	352°20.3	9.9	-18°52.5	-6.3	56.7
5	253°32.3	2°05.1	6°49.2	9.9	-18°58.8	-6.2	56.7
6	268°32.5	2°06.1	21°18.1	9.9	-19°04.9	-6.1	56.6
7	283°32.6	2°07.1	35°47.0	9.9	-19°11.0	-6.0	56.6
8	298°32.8	2°08.1	50°15.9	9.9	-19°16.9	-5.9	56.6
9	313°33.0	2°09.1	64°44.8	9.9	-19°22.7	-5.8	56.5
10	328°33.2	2°10.0	79°13.8	9.9	-19°28.4	-5.7	56.5
11	343°33.4	2°11.0	93°42.7	9.9	-19°34.0	-5.5	56.5
12	358°33.6	2°12.0	108°11.6	9.9	-19°39.5	-5.4	56.4
13	13°33.8	2°13.0	122°40.5	9.9	-19°44.9	-5.3	56.4
14	28°34.0	2°14.0	137°09.5	9.9	-19°50.2	-5.2	56.4
15	43°34.2	2°14.9	151°38.4	9.9	-19°55.3	-5.1	56.3
16	58°34.3	2°15.9	166°07.4	10.0	-20°00.4	-5.0	56.3
17	73°34.5	2°16.9	180°36.3	10.0	-20°05.3	-4.9	56.3
18	88°34.7	2°17.9	195°05.3	10.0	-20°10.1	-4.8	56.2
19	103°34.9	2°18.9	209°34.3	10.0	-20°14.8	-4.7	56.2
20	118°35.1	2°19.8	224°03.3	10.0	-20°19.4	-4.5	56.2
21	133°35.3	2°20.8	238°32.2	10.0	-20°23.9	-4.4	56.1
22	148°35.5	2°21.8	253°01.2	10.0	-20°28.3	-4.3	56.1
23	163°35.7	2°22.8	267°30.3	10.0	-20°32.5	-4.2	56.1
	SD.=16.0	d=1.0			S.D.=15.5		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°35.9	2°23.8	281°59.3	10.0	-20°36.7	-4.1	56.0
1	193°36.0	2°24.7	296°28.3	10.0	-20°40.7	-4.0	56.0
2	208°36.2	2°25.7	310°57.3	10.0	-20°44.7	-3.9	56.0
3	223°36.4	2°26.7	325°26.4	10.1	-20°48.5	-3.8	55.9
4	238°36.6	2°27.7	339°55.5	10.1	-20°52.2	-3.6	55.9
5	253°36.8	2°28.7	354°24.5	10.1	-20°55.8	-3.5	55.9
6	268°37.0	2°29.6	8°53.6	10.1	-20°59.3	-3.4	55.8
7	283°37.2	2°30.6	23°22.7	10.1	-21°02.6	-3.3	55.8
8	298°37.4	2°31.6	37°51.8	10.1	-21°05.9	-3.2	55.8
9	313°37.6	2°32.6	52°21.0	10.1	-21°09.0	-3.1	55.7
10	328°37.7	2°33.6	66°50.1	10.1	-21°12.1	-3.0	55.7
11	343°37.9	2°34.5	81°19.2	10.2	-21°15.0	-2.9	55.7
12	358°38.1	2°35.5	95°48.4	10.2	-21°17.8	-2.8	55.6
13	13°38.3	2°36.5	110°17.6	10.2	-21°20.5	-2.6	55.6
14	28°38.5	2°37.5	124°46.8	10.2	-21°23.1	-2.5	55.6
15	43°38.7	2°38.4	139°16.0	10.2	-21°25.5	-2.4	55.6
16	58°38.9	2°39.4	153°45.2	10.2	-21°27.9	-2.3	55.5
17	73°39.1	2°40.4	168°14.5	10.3	-21°30.1	-2.2	55.5
18	88°39.3	2°41.4	182°43.8	10.3	-21°32.3	-2.1	55.5
19	103°39.4	2°42.4	197°13.1	10.3	-21°34.3	-2.0	55.4
20	118°39.6	2°43.3	211°42.4	10.3	-21°36.2	-1.9	55.4
21	133°39.8	2°44.3	226°11.7	10.3	-21°38.0	-1.7	55.4
22	148°40.0	2°45.3	240°41.0	10.4	-21°39.7	-1.6	55.4
23	163°40.2	2°46.3	255°10.4	10.4	-21°41.3	-1.5	55.3
	SD.=16.0	d=1.0			S.D.=15.3		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°40.4	2°47.3	269°39.8	10.4	-21°42.7	-1.4	55.3
1	193°40.6	2°48.2	284°09.2	10.4	-21°44.1	-1.3	55.3
2	208°40.8	2°49.2	298°38.6	10.4	-21°45.4	-1.2	55.3
3	223°41.0	2°50.2	313°08.1	10.5	-21°46.5	-1.1	55.2
4	238°41.1	2°51.2	327°37.5	10.5	-21°47.5	-1.0	55.2
5	253°41.3	2°52.1	342°07.0	10.5	-21°48.4	-0.9	55.2
6	268°41.5	2°53.1	356°36.5	10.5	-21°49.2	-0.8	55.2
7	283°41.7	2°54.1	11°06.1	10.6	-21°49.9	-0.6	55.1
8	298°41.9	2°55.1	25°35.7	10.6	-21°50.5	-0.5	55.1
9	313°42.1	2°56.0	40°05.2	10.6	-21°51.0	-0.4	55.1
10	328°42.3	2°57.0	54°34.9	10.6	-21°51.4	-0.3	55.1
11	343°42.5	2°58.0	69°04.5	10.7	-21°51.6	-0.2	55.0
12	358°42.7	2°59.0	83°34.2	10.7	-21°51.8	-0.1	55.0
13	13°42.8	2°60.0	98°03.9	10.7	-21°51.8	0.0	55.0
14	28°43.0	3°00.9	112°33.6	10.7	-21°51.8	0.1	55.0
15	43°43.2	3°01.9	127°03.3	10.8	-21°51.6	0.2	54.9
16	58°43.4	3°02.9	141°33.1	10.8	-21°51.3	0.3	54.9
17	73°43.6	3°03.9	156°02.9	10.8	-21°50.9	0.4	54.9
18	88°43.8	3°04.8	170°32.8	10.8	-21°50.4	0.5	54.9
19	103°44.0	3°05.8	185°02.6	10.9	-21°49.8	0.7	54.9
20	118°44.2	3°06.8	199°32.5	10.9	-21°49.1	0.8	54.8
21	133°44.4	3°07.8	214°02.4	10.9	-21°48.3	0.9	54.8
22	148°44.5	3°08.7	228°32.4	11.0	-21°47.4	1.0	54.8
23	163°44.7	3°09.7	243°02.4	11.0	-21°46.4	1.1	54.8
	SD.=16.0	d=1.0			S.D.=15.1		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:31	04:13	05:24	18:50	20:01	21:46
70	02:59	04:25	05:28	18:45	19:49	21:16
68	03:20	04:35	05:32	18:41	19:39	20:55
66	03:36	04:43	05:35	18:38	19:31	20:38
64	03:49	04:49	05:37	18:35	19:24	20:25
62	03:59	04:55	05:40	18:33	19:18	20:14
60	04:08	04:60	05:42	18:31	19:13	20:05
58	04:16	05:04	05:43	18:29	19:09	19:57
56	04:22	05:07	05:45	18:27	19:05	19:50
54	04:28	05:11	05:46	18:26	19:02	19:45
52	04:33	05:13	05:47	18:25	18:59	19:39
50	04:37	05:16	05:48	18:23	18:56	19:35
45	04:47	05:21	05:51	18:21	18:50	19:25
40	04:54	05:26	05:53	18:19	18:46	19:18
35	04:59	05:29	05:54	18:17	18:42	19:12
30	05:04	05:32	05:56	18:15	18:39	19:07
20	05:11	05:36	05:58	18:13	18:35	19:01
10	05:15	05:39	06:00	18:11	18:32	18:56
0	05:18	05:42	06:02	18:09	18:29	18:53
-10	05:19	05:43	06:04	18:07	18:28	18:52
-20	05:18	05:44	06:06	18:05	18:27	18:53
-30	05:16	05:44	06:07	18:03	18:27	18:55
-35	05:14	05:43	06:08	18:02	18:27	18:56
-40	05:11	05:43	06:10	18:01	18:28	18:59
-45	05:07	05:42	06:11	17:59	18:29	19:03
-50	05:02	05:40	06:12	17:58	18:30	19:07
-52	04:60	05:39	06:13	17:57	18:31	19:10
-54	04:57	05:38	06:14	17:56	18:31	19:13
-56	04:54	05:37	06:14	17:55	18:32	19:16
-58	04:50	05:36	06:15	17:54	18:33	19:19
-60	04:46	05:35	06:16	17:53	18:35	19:23

		Moonrise			**Moonset**	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	–:–	–:–	–:–	–:–	–:–
70	03:10	–:–	–:–	05:43	–:–	–:–
68	02:17	04:07	05:53	06:37	06:34	06:34
66	01:45	03:16	04:29	07:09	07:25	07:58
64	01:21	02:44	03:51	07:34	07:58	08:36
62	01:02	02:20	03:25	07:53	08:22	09:03
60	00:47	02:01	03:04	08:09	08:41	09:23
58	00:34	01:46	02:47	08:22	08:56	09:40
56	00:23	01:33	02:33	08:34	09:10	09:55
54	00:13	01:21	02:20	08:44	09:22	10:07
52	00:05	01:11	02:09	08:53	09:32	10:18
50	–:–	01:02	01:60	09:01	09:41	10:28
45	–:–	00:43	01:39	09:18	10:01	10:48
40	–:–	00:27	01:23	09:33	10:17	11:05
35	–:–	00:14	01:09	09:45	10:30	11:19
30	–:–	00:03	00:57	09:55	10:42	11:31
20	23:43	–:–	00:36	10:13	11:02	11:51
10	23:27	–:–	00:19	10:29	11:19	12:09
0	23:11	–:–	00:02	10:44	11:35	12:26
-10	22:55	23:45	–:–	10:59	11:52	12:43
-20	22:38	23:27	–:–	11:15	12:09	13:01
-30	22:19	23:07	23:57	11:33	12:29	13:22
-35	22:08	22:55	23:45	11:44	12:41	13:34
-40	21:55	22:41	23:31	11:56	12:55	13:47
-45	21:40	22:25	23:15	12:11	13:11	14:04
-50	21:22	22:05	22:55	12:28	13:30	14:24
-52	21:13	21:56	22:45	12:37	13:40	14:34
-54	21:04	21:45	22:34	12:46	13:50	14:44
-56	20:53	21:33	22:22	12:57	14:02	14:57
-58	20:40	21:19	22:08	13:09	14:16	15:11
-60	20:26	21:03	21:51	13:23	14:32	15:28

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
26	05:55	05:46	12:05	04:31	16:57	20(67%)
27	05:36	05:27	12:05	05:23	17:48	21(57%)
28	05:18	05:09	12:05	06:14	18:39	22(47%)

March 29, 30 ,31 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	186°06.5	211°14.4	-11°15.6	130°03.3	20°42.0	282°30.3	-22°40.4	254°51.8	-21°35.0
1	201°08.9	226°14.0	-11°14.7	145°04.0	20°42.4	297°32.7	-22°40.4	269°54.2	-21°35.0
2	216°11.4	241°13.5	-11°13.7	160°04.8	20°42.8	312°35.1	-22°40.4	284°56.5	-21°35.0
3	231°13.9	256°13.1	-11°12.7	175°05.5	20°43.2	327°37.4	-22°40.4	299°58.8	-21°34.9
4	246°16.3	271°12.7	-11°11.7	190°06.3	20°43.5	342°39.8	-22°40.4	315°01.2	-21°34.9
5	261°18.8	286°12.2	-11°10.8	205°07.0	20°43.9	357°42.1	-22°40.4	330°03.5	-21°34.9
6	276°21.3	301°11.8	-11°09.8	220°07.7	20°44.3	12°44.5	-22°40.4	345°05.8	-21°34.9
7	291°23.7	316°11.3	-11°08.8	235°08.5	20°44.7	27°46.9	-22°40.4	0°08.1	-21°34.9
8	306°26.2	331°10.9	-11°07.8	250°09.2	20°45.1	42°49.2	-22°40.4	15°10.5	-21°34.9
9	321°28.6	346°10.5	-11°06.8	265°10.0	20°45.5	57°51.6	-22°40.4	30°12.8	-21°34.8
10	336°31.1	1°10.0	-11°05.9	280°10.7	20°45.8	72°53.9	-22°40.4	45°15.1	-21°34.8
11	351°33.6	16°09.6	-11°04.9	295°11.4	20°46.2	87°56.3	-22°40.4	60°17.5	-21°34.8
12	6°36.0	31°09.2	-11°03.9	310°12.2	20°46.6	102°58.7	-22°40.4	75°19.8	-21°34.8
13	21°38.5	46°08.7	-11°02.9	325°12.9	20°47.0	118°01.0	-22°40.4	90°22.1	-21°34.8
14	36°41.0	61°08.3	-11°01.9	340°13.7	20°47.4	133°03.4	-22°40.4	105°24.5	-21°34.8
15	51°43.4	76°07.8	-11°00.9	355°14.4	20°47.7	148°05.7	-22°40.4	120°26.8	-21°34.7
16	66°45.9	91°07.4	-10°60.0	10°15.1	20°48.1	163°08.1	-22°40.4	135°29.1	-21°34.7
17	81°48.4	106°07.0	-10°59.0	25°15.9	20°48.5	178°10.5	-22°40.4	150°31.4	-21°34.7
18	96°50.8	121°06.5	-10°58.0	40°16.6	20°48.9	193°12.8	-22°40.4	165°33.8	-21°34.7
19	111°53.3	136°06.1	-10°57.0	55°17.4	20°49.3	208°15.2	-22°40.5	180°36.1	-21°34.7
20	126°55.7	151°05.7	-10°56.0	70°18.1	20°49.6	223°17.6	-22°40.5	195°38.4	-21°34.7
21	141°58.2	166°05.2	-10°55.0	85°18.8	20°50.0	238°19.9	-22°40.5	210°40.8	-21°34.6
22	157°00.7	181°04.8	-10°54.0	100°19.6	20°50.4	253°22.3	-22°40.5	225°43.1	-21°34.6
23	172°03.1	196°04.4	-10°53.1	115°20.3	20°50.8	268°24.7	-22°40.5	240°45.4	-21°34.6
Mer.pass.:11:33		v-0.4 d1.0 m-3.9		v0.7 d0.4 m1.4		v2.4 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	187°05.6	211°03.9	-10°52.1	130°21.0	20°51.2	283°27.0	-22°40.5	255°47.8	-21°34.6
1	202°08.1	226°03.5	-10°51.1	145°21.8	20°51.5	298°29.4	-22°40.5	270°50.1	-21°34.6
2	217°10.5	241°03.1	-10°50.1	160°22.5	20°51.9	313°31.7	-22°40.5	285°52.4	-21°34.6
3	232°13.0	256°02.6	-10°49.1	175°23.3	20°52.3	328°34.1	-22°40.5	300°54.8	-21°34.6
4	247°15.5	271°02.2	-10°48.1	190°24.0	20°52.7	343°36.5	-22°40.5	315°57.1	-21°34.5
5	262°17.9	286°01.8	-10°47.1	205°24.7	20°53.0	358°38.8	-22°40.5	330°59.4	-21°34.5
6	277°20.4	301°01.3	-10°46.1	220°25.5	20°53.4	13°41.2	-22°40.5	346°01.8	-21°34.5
7	292°22.9	316°00.9	-10°45.1	235°26.2	20°53.8	28°43.6	-22°40.5	1°04.1	-21°34.5
8	307°25.3	331°00.5	-10°44.1	250°27.0	20°54.2	43°45.9	-22°40.5	16°06.4	-21°34.5
9	322°27.8	346°00.0	-10°43.2	265°27.7	20°54.5	58°48.3	-22°40.5	31°08.8	-21°34.5
10	337°30.2	0°59.6	-10°42.2	280°28.4	20°54.9	73°50.7	-22°40.5	46°11.1	-21°34.4
11	352°32.7	15°59.2	-10°41.2	295°29.2	20°55.3	88°53.1	-22°40.5	61°13.4	-21°34.4
12	7°35.2	30°58.8	-10°40.2	310°29.9	20°55.7	103°55.4	-22°40.5	76°15.8	-21°34.4
13	22°37.6	45°58.3	-10°39.2	325°30.6	20°56.0	118°57.8	-22°40.5	91°18.1	-21°34.4
14	37°40.1	60°57.9	-10°38.2	340°31.4	20°56.4	134°00.2	-22°40.5	106°20.4	-21°34.4
15	52°42.6	75°57.5	-10°37.2	355°32.1	20°56.8	149°02.5	-22°40.5	121°22.8	-21°34.4
16	67°45.0	90°57.0	-10°36.2	10°32.8	20°57.2	164°04.9	-22°40.5	136°25.1	-21°34.3
17	82°47.5	105°56.6	-10°35.2	25°33.6	20°57.5	179°07.3	-22°40.5	151°27.4	-21°34.3
18	97°50.0	120°56.2	-10°34.2	40°34.3	20°57.9	194°09.6	-22°40.5	166°29.8	-21°34.3
19	112°52.4	135°55.8	-10°33.2	55°35.1	20°58.3	209°12.0	-22°40.5	181°32.1	-21°34.3
20	127°54.9	150°55.3	-10°32.2	70°35.8	20°58.7	224°14.4	-22°40.5	196°34.5	-21°34.3
21	142°57.4	165°54.9	-10°31.2	85°36.5	20°59.0	239°16.8	-22°40.5	211°36.8	-21°34.3
22	157°59.8	180°54.5	-10°30.2	100°37.3	20°59.4	254°19.1	-22°40.5	226°39.1	-21°34.2
23	173°02.3	195°54.1	-10°29.2	115°38.0	20°59.8	269°21.5	-22°40.5	241°41.5	-21°34.2
Mer.pass.:11:29		v-0.4 d1.0 m-3.9		v0.7 d0.4 m1.4		v2.4 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	188°04.7	210°53.6	-10°28.2	130°38.7	21°00.1	284°23.9	-22°40.5	256°43.8	-21°34.2
1	203°07.2	225°53.2	-10°27.2	145°39.5	21°00.5	299°26.3	-22°40.6	271°46.1	-21°34.2
2	218°09.7	240°52.8	-10°26.2	160°40.2	21°00.9	314°28.6	-22°40.6	286°48.5	-21°34.2
3	233°12.1	255°52.4	-10°25.2	175°40.9	21°01.3	329°31.0	-22°40.6	301°50.8	-21°34.2
4	248°14.6	270°51.9	-10°24.2	190°41.7	21°01.6	344°33.4	-22°40.6	316°53.1	-21°34.2
5	263°17.1	285°51.5	-10°23.2	205°42.4	21°02.0	359°35.8	-22°40.6	331°55.5	-21°34.1
6	278°19.5	300°51.1	-10°22.2	220°43.2	21°02.4	14°38.1	-22°40.6	346°57.8	-21°34.1
7	293°22.0	315°50.7	-10°21.2	235°43.9	21°02.7	29°40.5	-22°40.6	2°00.2	-21°34.1
8	308°24.5	330°50.2	-10°20.2	250°44.6	21°03.1	44°42.9	-22°40.6	17°02.5	-21°34.1
9	323°26.9	345°49.8	-10°19.2	265°45.4	21°03.5	59°45.3	-22°40.6	32°04.8	-21°34.1
10	338°29.4	0°49.4	-10°18.2	280°46.1	21°03.8	74°47.6	-22°40.6	47°07.2	-21°34.1
11	353°31.8	15°49.0	-10°17.1	295°46.8	21°04.2	89°50.0	-22°40.6	62°09.5	-21°34.0
12	8°34.3	30°48.5	-10°16.1	310°47.6	21°04.6	104°52.4	-22°40.6	77°11.8	-21°34.0
13	23°36.8	45°48.1	-10°15.1	325°48.3	21°04.9	119°54.8	-22°40.6	92°14.2	-21°34.0
14	38°39.2	60°47.7	-10°14.1	340°49.0	21°05.3	134°57.1	-22°40.6	107°16.5	-21°34.0
15	53°41.7	75°47.3	-10°13.1	355°49.8	21°05.7	149°59.5	-22°40.6	122°18.9	-21°34.0
16	68°44.2	90°46.9	-10°12.1	10°50.5	21°06.0	165°01.9	-22°40.6	137°21.2	-21°34.0
17	83°46.6	105°46.4	-10°11.1	25°51.2	21°06.4	180°04.3	-22°40.6	152°23.5	-21°33.9
18	98°49.1	120°46.0	-10°10.1	40°52.0	21°06.8	195°06.7	-22°40.6	167°25.9	-21°33.9
19	113°51.6	135°45.6	-10°09.1	55°52.7	21°07.1	210°09.0	-22°40.6	182°28.2	-21°33.9
20	128°54.0	150°45.2	-10°08.1	70°53.4	21°07.5	225°11.4	-22°40.6	197°30.6	-21°33.9
21	143°56.5	165°44.7	-10°07.0	85°54.2	21°07.9	240°13.8	-22°40.6	212°32.9	-21°33.9
22	158°59.0	180°44.3	-10°06.0	100°54.9	21°08.2	255°16.2	-22°40.6	227°35.2	-21°33.9
23	174°01.4	195°43.9	-10°05.0	115°55.6	21°08.6	270°18.6	-22°40.6	242°37.6	-21°33.9
Mer.pass.:11:25		v-0.4 d1.0 m-3.9		v0.7 d0.4 m1.4		v2.4 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.3
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.1
Achernar	335°24.4	-57°08.6
Hamal	327°56.7	23°33.0
Polaris	316°25.6	89°20.8
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.8	46°01.1
Bellatrix	278°27.9	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.7
Betelgeuse	270°57.1	7°24.4
Canopus	263°54.4	-52°42.8
Sirius	258°30.1	-16°44.7
Adara	255°09.4	-29°00.3
Procyon	244°55.4	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.2	-59°34.6
Suhail	222°49.3	-43°30.9
Miaplacidus	221°38.3	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.2	61°38.9
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°38.9
Acrux	173°04.2	-63°12.3
Gacrux	171°55.9	-57°13.2
Alioth	166°16.7	55°51.3
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.0
Hadar	148°41.7	-60°27.7
Menkent	148°02.6	-36°27.7
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.8	-60°54.6
Zubenelg.	137°00.8	-16°07.2
Kochab	137°19.1	74°04.5
Alphecca	126°07.4	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.3	-69°03.3
Sabik	102°07.9	-15°44.8
Shaula	96°16.5	-37°06.8
Rasalhague	96°02.7	12°32.7
Etamin	90°44.2	51°29.0
Kaus Aust.	83°38.6	-34°22.3
Vega	80°36.3	38°47.8
Nunki	75°53.5	-26°16.2
Altair	62°04.6	8°55.0
Peacock	53°13.3	-56°40.2
Deneb	49°29.1	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.2	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.9	28°11.0
Markab	13°34.7	15°18.3

2019/3/2	**SHA**	**Mer.pass**
Venus	25°07.9	09:55
Mars	303°56.8	15:19
Jupiter	96°23.9	05:09
Saturn	68°45.4	06:59

2019/3/3	**SHA**	**Mer.pass**
Venus	23°58.3	09:56
Mars	303°15.4	15:18
Jupiter	96°21.4	05:05
Saturn	68°42.2	06:56

2019/3/3	**SHA**	**Mer.pass**
Venus	22°48.9	09:57
Mars	302°34.0	15:17
Jupiter	96°19.1	05:02
Saturn	68°39.1	06:52

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°44.9	3°10.7	257°32.4	11.0	-21°45.3	1.2	54.8
1	193°45.1	3°11.7	272°02.4	11.1	-21°44.0	1.3	54.7
2	208°45.3	3°12.6	286°32.5	11.1	-21°42.7	1.4	54.7
3	223°45.5	3°13.6	301°02.6	11.1	-21°41.3	1.5	54.7
4	238°45.7	3°14.6	315°32.8	11.2	-21°39.7	1.6	54.7
5	253°45.9	3°15.6	330°02.9	11.2	-21°38.1	1.7	54.7
6	268°46.0	3°16.5	344°33.1	11.2	-21°36.3	1.8	54.6
7	283°46.2	3°17.5	359°03.4	11.3	-21°34.5	1.9	54.6
8	298°46.4	3°18.5	13°33.7	11.3	-21°32.5	2.0	54.6
9	313°46.6	3°19.5	28°04.0	11.3	-21°30.5	2.1	54.6
10	328°46.8	3°20.4	42°34.3	11.4	-21°28.3	2.2	54.6
11	343°47.0	3°21.4	57°04.7	11.4	-21°26.1	2.3	54.6
12	358°47.2	3°22.4	71°35.1	11.4	-21°23.7	2.4	54.5
13	13°47.4	3°23.4	86°05.5	11.5	-21°21.2	2.5	54.5
14	28°47.6	3°24.3	100°36.0	11.5	-21°18.7	2.6	54.5
15	43°47.7	3°25.3	115°06.5	11.5	-21°16.0	2.7	54.5
16	58°47.9	3°26.3	129°37.1	11.6	-21°13.3	2.8	54.5
17	73°48.1	3°27.3	144°07.7	11.6	-21°10.4	2.9	54.5
18	88°48.3	3°28.2	158°38.3	11.6	-21°07.5	3.0	54.4
19	103°48.5	3°29.2	173°09.0	11.7	-21°04.4	3.1	54.4
20	118°48.7	3°30.2	187°39.7	11.7	-21°01.3	3.2	54.4
21	133°48.9	3°31.1	202°10.4	11.8	-20°58.0	3.3	54.4
22	148°49.1	3°32.1	216°41.2	11.8	-20°54.7	3.4	54.4
23	163°49.2	3°33.1	231°12.0	11.8	-20°51.2	3.5	54.4
	SD.=16.0	d=1.0			S.D.=14.9		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°49.4	3°34.1	245°42.9	11.9	-20°47.7	3.6	54.4
1	193°49.6	3°35.0	260°13.8	11.9	-20°44.1	3.7	54.4
2	208°49.8	3°36.0	274°44.7	11.9	-20°40.4	3.8	54.3
3	223°50.0	3°37.0	289°15.7	12.0	-20°36.6	3.9	54.3
4	238°50.2	3°38.0	303°46.7	12.0	-20°32.6	4.0	54.3
5	253°50.4	3°38.9	318°17.7	12.1	-20°28.6	4.0	54.3
6	268°50.6	3°39.9	332°48.8	12.1	-20°24.5	4.1	54.3
7	283°50.7	3°40.9	347°19.9	12.1	-20°20.4	4.2	54.3
8	298°50.9	3°41.8	1°51.1	12.2	-20°16.1	4.3	54.3
9	313°51.1	3°42.8	16°22.3	12.2	-20°11.7	4.4	54.3
10	328°51.3	3°43.8	30°53.5	12.3	-20°07.2	4.5	54.2
11	343°51.5	3°44.8	45°24.8	12.3	-20°02.7	4.6	54.2
12	358°51.7	3°45.7	59°56.1	12.3	-19°58.1	4.7	54.2
13	13°51.9	3°46.7	74°27.5	12.4	-19°53.3	4.8	54.2
14	28°52.1	3°47.7	88°58.9	12.4	-19°48.5	4.9	54.2
15	43°52.2	3°48.6	103°30.3	12.5	-19°43.6	5.0	54.2
16	58°52.4	3°49.6	118°01.8	12.5	-19°38.6	5.0	54.2
17	73°52.6	3°50.6	132°33.3	12.5	-19°33.5	5.1	54.2
18	88°52.8	3°51.6	147°04.9	12.6	-19°28.3	5.2	54.2
19	103°53.0	3°52.5	161°36.5	12.6	-19°23.1	5.3	54.2
20	118°53.2	3°53.5	176°08.1	12.7	-19°17.8	5.4	54.2
21	133°53.4	3°54.5	190°39.8	12.7	-19°12.3	5.5	54.2
22	148°53.5	3°55.4	205°11.5	12.7	-19°06.8	5.6	54.1
23	163°53.7	3°56.4	219°43.3	12.8	-19°01.2	5.6	54.1
	SD.=16.0	d=1.0			S.D.=14.8		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°53.9	3°57.4	234°15.1	12.8	-18°55.5	5.7	54.1
1	193°54.1	3°58.3	248°46.9	12.9	-18°49.8	5.8	54.1
2	208°54.3	3°59.3	263°18.8	12.9	-18°43.9	5.9	54.1
3	223°54.5	4°00.3	277°50.7	12.9	-18°38.0	6.0	54.1
4	238°54.7	4°01.3	292°22.7	13.0	-18°32.0	6.1	54.1
5	253°54.9	4°02.2	306°54.7	13.0	-18°25.9	6.1	54.1
6	268°55.0	4°03.2	321°26.7	13.1	-18°19.7	6.2	54.1
7	283°55.2	4°04.2	335°58.8	13.1	-18°13.5	6.3	54.1
8	298°55.4	4°05.1	350°30.9	13.1	-18°07.1	6.4	54.1
9	313°55.6	4°06.1	5°03.0	13.2	-18°00.7	6.4	54.1
10	328°55.8	4°07.1	19°35.2	13.2	-17°54.2	6.5	54.1
11	343°56.0	4°08.0	34°07.4	13.2	-17°47.7	6.6	54.1
12	358°56.2	4°09.0	48°39.7	13.3	-17°41.0	6.7	54.1
13	13°56.3	4°10.0	63°12.0	13.3	-17°34.3	6.8	54.1
14	28°56.5	4°10.9	77°44.4	13.4	-17°27.5	6.8	54.1
15	43°56.7	4°11.9	92°16.7	13.4	-17°20.7	6.9	54.1
16	58°56.9	4°12.9	106°49.2	13.4	-17°13.7	7.0	54.1
17	73°57.1	4°13.8	121°21.6	13.5	-17°06.7	7.1	54.1
18	88°57.3	4°14.8	135°54.1	13.5	-16°59.6	7.1	54.1
19	103°57.5	4°15.8	150°26.6	13.5	-16°52.4	7.2	54.1
20	118°57.6	4°16.7	164°59.2	13.6	-16°45.2	7.3	54.1
21	133°57.8	4°17.7	179°31.8	13.6	-16°37.9	7.4	54.1
22	148°58.0	4°18.7	194°04.4	13.7	-16°30.5	7.4	54.1
23	163°58.2	4°19.6	208°37.1	13.7	-16°23.0	7.5	54.1
	SD.=16.0	d=1.0			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:04	03:56	05:08	19:04	20:18	22:14
70	02:39	04:10	05:14	18:57	20:03	21:36
68	03:03	04:21	05:19	18:52	19:51	21:10
66	03:21	04:30	05:23	18:48	19:41	20:51
64	03:36	04:38	05:27	18:44	19:33	20:36
62	03:48	04:44	05:30	18:41	19:27	20:24
60	03:58	04:50	05:32	18:38	19:21	20:14
58	04:06	04:55	05:35	18:36	19:16	20:05
56	04:13	04:59	05:37	18:33	19:11	19:57
54	04:20	05:03	05:39	18:32	19:07	19:51
52	04:25	05:06	05:40	18:30	19:04	19:45
50	04:30	05:09	05:42	18:28	19:01	19:40
45	04:41	05:16	05:45	18:25	18:54	19:29
40	04:49	05:21	05:48	18:22	18:49	19:21
35	04:55	05:25	05:50	18:19	18:45	19:15
30	05:00	05:28	05:52	18:17	18:41	19:09
20	05:08	05:34	05:56	18:14	18:36	19:02
10	05:13	05:38	05:59	18:11	18:32	18:56
0	05:17	05:41	06:01	18:08	18:29	18:53
-10	05:18	05:43	06:04	18:05	18:26	18:51
-20	05:19	05:44	06:06	18:02	18:24	18:50
-30	05:18	05:45	06:09	17:59	18:23	18:51
-35	05:16	05:46	06:11	17:58	18:23	18:52
-40	05:14	05:46	06:13	17:56	18:23	18:54
-45	05:11	05:45	06:15	17:54	18:23	18:57
-50	05:07	05:45	06:17	17:51	18:23	19:01
-52	05:05	05:44	06:18	17:50	18:24	19:03
-54	05:03	05:44	06:19	17:49	18:24	19:05
-56	05:00	05:43	06:20	17:48	18:24	19:08
-58	04:57	05:43	06:22	17:46	18:25	19:11
-60	04:53	05:42	06:23	17:44	18:26	19:14

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	06:58	–:–	–:–	10:32
68	06:22	06:20	06:16	07:49	09:32	11:12
66	05:14	05:37	05:48	08:56	10:14	11:40
64	04:38	05:08	05:26	09:32	10:42	12:01
62	04:13	04:46	05:09	09:58	11:04	12:18
60	03:53	04:28	04:54	10:18	11:22	12:32
58	03:36	04:13	04:42	10:34	11:36	12:44
56	03:22	04:01	04:31	10:48	11:49	12:54
54	03:10	03:50	04:22	11:00	11:59	13:03
52	02:59	03:40	04:13	11:11	12:09	13:11
50	02:49	03:31	04:05	11:20	12:18	13:19
45	02:29	03:12	03:49	11:40	12:36	13:34
40	02:13	02:57	03:36	11:56	12:51	13:47
35	01:59	02:44	03:24	12:10	13:03	13:58
30	01:47	02:33	03:14	12:22	13:14	14:07
20	01:27	02:13	02:57	12:42	13:33	14:23
10	01:09	01:57	02:42	12:59	13:49	14:37
0	00:52	01:41	02:28	13:16	14:04	14:50
-10	00:35	01:25	02:14	13:32	14:19	15:03
-20	00:17	01:08	01:59	13:49	14:35	15:17
-30	–:–	00:49	01:41	14:09	14:53	15:33
-35	–:–	00:37	01:31	14:21	15:04	15:42
-40	–:–	00:24	01:20	14:35	15:16	15:52
-45	–:–	00:09	01:06	14:50	15:30	16:05
-50	23:50	–:–	00:49	15:10	15:48	16:19
-52	23:41	–:–	00:41	15:19	15:56	16:26
-54	23:31	–:–	00:32	15:29	16:05	16:34
-56	23:19	–:–	00:23	15:41	16:15	16:42
-58	23:06	–:–	00:11	15:54	16:27	16:52
-60	22:51	23:58	–:–	16:10	16:40	17:03

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
29	05:00	04:51	12:04	07:03	19:28	23(37%)
30	04:42	04:33	12:04	07:52	20:15	24(29%)
31	04:24	04:15	12:04	08:39	21:01	25(20%)

April 01, 02 ,03 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	189°03.9	210°43.5	-10°04.0	130°56.4	21°09.0	285°20.9	-22°40.6	257°39.9	-21°33.8
1	204°06.3	225°43.1	-10°03.0	145°57.1	21°09.3	300°23.3	-22°40.6	272°42.3	-21°33.8
2	219°08.8	240°42.7	-10°02.0	160°57.8	21°09.7	315°25.7	-22°40.6	287°44.6	-21°33.8
3	234°11.3	255°42.2	-10°01.0	175°58.6	21°10.0	330°28.1	-22°40.6	302°46.9	-21°33.8
4	249°13.7	270°41.8	-9°60.0	190°59.3	21°10.4	345°30.5	-22°40.6	317°49.3	-21°33.8
5	264°16.2	285°41.4	-9°58.9	206°00.0	21°10.8	0°32.9	-22°40.6	332°51.6	-21°33.8
6	279°18.7	300°41.0	-9°57.9	221°00.8	21°11.1	15°35.2	-22°40.6	347°54.0	-21°33.8
7	294°21.1	315°40.6	-9°56.9	236°01.5	21°11.5	30°37.6	-22°40.6	2°56.3	-21°33.7
8	309°23.6	330°40.2	-9°55.9	251°02.2	21°11.9	45°40.0	-22°40.6	17°58.7	-21°33.7
9	324°26.1	345°39.7	-9°54.9	266°03.0	21°12.2	60°42.4	-22°40.6	33°01.0	-21°33.7
10	339°28.5	0°39.3	-9°53.8	281°03.7	21°12.6	75°44.8	-22°40.6	48°03.3	-21°33.7
11	354°31.0	15°38.9	-9°52.8	296°04.4	21°12.9	90°47.2	-22°40.6	63°05.7	-21°33.7
12	9°33.4	30°38.5	-9°51.8	311°05.2	21°13.3	105°49.6	-22°40.7	78°08.0	-21°33.7
13	24°35.9	45°38.1	-9°50.8	326°05.9	21°13.7	120°51.9	-22°40.7	93°10.4	-21°33.6
14	39°38.4	60°37.7	-9°49.8	341°06.6	21°14.0	135°54.3	-22°40.7	108°12.7	-21°33.6
15	54°40.8	75°37.2	-9°48.8	356°07.4	21°14.4	150°56.7	-22°40.7	123°15.1	-21°33.6
16	69°43.3	90°36.8	-9°47.7	11°08.1	21°14.7	165°59.1	-22°40.7	138°17.4	-21°33.6
17	84°45.8	105°36.4	-9°46.7	26°08.8	21°15.1	181°01.5	-22°40.7	153°19.7	-21°33.6
18	99°48.2	120°36.0	-9°45.7	41°09.6	21°15.5	196°03.9	-22°40.7	168°22.1	-21°33.6
19	114°50.7	135°35.6	-9°44.7	56°10.3	21°15.8	211°06.3	-22°40.7	183°24.4	-21°33.6
20	129°53.2	150°35.2	-9°43.6	71°11.0	21°16.2	226°08.7	-22°40.7	198°26.8	-21°33.5
21	144°55.6	165°34.8	-9°42.6	86°11.8	21°16.5	241°11.0	-22°40.7	213°29.1	-21°33.5
22	159°58.1	180°34.3	-9°41.6	101°12.5	21°16.9	256°13.4	-22°40.7	228°31.5	-21°33.5
23	175°00.6	195°33.9	-9°40.6	116°13.2	21°17.2	271°15.8	-22°40.7	243°33.8	-21°33.5
Mer.pass.:11:21		v-0.4 d1.0 m-3.9		v0.7 d0.4 m1.4		v2.4 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	190°03.0	210°33.5	-9°39.5	131°14.0	21°17.6	286°18.2	-22°40.7	258°36.1	-21°33.5
1	205°05.5	225°33.1	-9°38.5	146°14.7	21°18.0	301°20.6	-22°40.7	273°38.5	-21°33.5
2	220°07.9	240°32.7	-9°37.5	161°15.4	21°18.3	316°23.0	-22°40.7	288°40.8	-21°33.5
3	235°10.4	255°32.3	-9°36.5	176°16.1	21°18.7	331°25.4	-22°40.7	303°43.2	-21°33.4
4	250°12.9	270°31.9	-9°35.4	191°16.9	21°19.0	346°27.8	-22°40.7	318°45.5	-21°33.4
5	265°15.3	285°31.5	-9°34.4	206°17.6	21°19.4	1°30.2	-22°40.7	333°47.9	-21°33.4
6	280°17.8	300°31.1	-9°33.4	221°18.3	21°19.7	16°32.6	-22°40.7	348°50.2	-21°33.4
7	295°20.3	315°30.6	-9°32.4	236°19.1	21°20.1	31°35.0	-22°40.7	3°52.6	-21°33.4
8	310°22.7	330°30.2	-9°31.3	251°19.8	21°20.4	46°37.3	-22°40.7	18°54.9	-21°33.4
9	325°25.2	345°29.8	-9°30.3	266°20.5	21°20.8	61°39.7	-22°40.7	33°57.3	-21°33.3
10	340°27.7	0°29.4	-9°29.3	281°21.3	21°21.2	76°42.1	-22°40.7	48°59.6	-21°33.3
11	355°30.1	15°29.0	-9°28.2	296°22.0	21°21.5	91°44.5	-22°40.7	64°01.9	-21°33.3
12	10°32.6	30°28.6	-9°27.2	311°22.7	21°21.9	106°46.9	-22°40.7	79°04.3	-21°33.3
13	25°35.1	45°28.2	-9°26.2	326°23.4	21°22.2	121°49.3	-22°40.7	94°06.6	-21°33.3
14	40°37.5	60°27.8	-9°25.1	341°24.2	21°22.6	136°51.7	-22°40.7	109°09.0	-21°33.3
15	55°40.0	75°27.4	-9°24.1	356°24.9	21°22.9	151°54.1	-22°40.7	124°11.3	-21°33.3
16	70°42.4	90°27.0	-9°23.1	11°25.6	21°23.3	166°56.5	-22°40.7	139°13.7	-21°33.2
17	85°44.9	105°26.6	-9°22.0	26°26.4	21°23.6	181°58.9	-22°40.7	154°16.0	-21°33.2
18	100°47.4	120°26.2	-9°21.0	41°27.1	21°24.0	197°01.3	-22°40.7	169°18.4	-21°33.2
19	115°49.8	135°25.7	-9°20.0	56°27.8	21°24.3	212°03.7	-22°40.7	184°20.7	-21°33.2
20	130°52.3	150°25.3	-9°18.9	71°28.5	21°24.7	227°06.1	-22°40.7	199°23.1	-21°33.2
21	145°54.8	165°24.9	-9°17.9	86°29.3	21°25.0	242°08.5	-22°40.7	214°25.4	-21°33.2
22	160°57.2	180°24.5	-9°16.9	101°30.0	21°25.4	257°10.9	-22°40.7	229°27.8	-21°33.2
23	175°59.7	195°24.1	-9°15.8	116°30.7	21°25.7	272°13.3	-22°40.7	244°30.1	-21°33.1
Mer.pass.:11:17		v-0.4 d1.0 m-3.9		v0.7 d0.4 m1.4		v2.4 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	191°02.2	210°23.7	-9°14.8	131°31.5	21°26.1	287°15.7	-22°40.7	259°32.5	-21°33.1
1	206°04.6	225°23.3	-9°13.8	146°32.2	21°26.4	302°18.1	-22°40.7	274°34.8	-21°33.1
2	221°07.1	240°22.9	-9°12.7	161°32.9	21°26.8	317°20.5	-22°40.7	289°37.2	-21°33.1
3	236°09.5	255°22.5	-9°11.7	176°33.7	21°27.1	332°22.9	-22°40.7	304°39.5	-21°33.1
4	251°12.0	270°22.1	-9°10.6	191°34.4	21°27.5	347°25.3	-22°40.7	319°41.9	-21°33.1
5	266°14.5	285°21.7	-9°09.6	206°35.1	21°27.8	2°27.7	-22°40.7	334°44.2	-21°33.1
6	281°16.9	300°21.3	-9°08.6	221°35.8	21°28.2	17°30.1	-22°40.7	349°46.6	-21°33.0
7	296°19.4	315°20.9	-9°07.5	236°36.6	21°28.5	32°32.5	-22°40.8	4°48.9	-21°33.0
8	311°21.9	330°20.5	-9°06.5	251°37.3	21°28.9	47°34.9	-22°40.8	19°51.3	-21°33.0
9	326°24.3	345°20.1	-9°05.5	266°38.0	21°29.2	62°37.3	-22°40.8	34°53.6	-21°33.0
10	341°26.8	0°19.7	-9°04.4	281°38.7	21°29.5	77°39.7	-22°40.8	49°56.0	-21°33.0
11	356°29.3	15°19.3	-9°03.4	296°39.5	21°29.9	92°42.1	-22°40.8	64°58.3	-21°33.0
12	11°31.7	30°18.9	-9°02.3	311°40.2	21°30.2	107°44.5	-22°40.8	80°00.7	-21°33.0
13	26°34.2	45°18.5	-9°01.3	326°40.9	21°30.6	122°46.9	-22°40.8	95°03.0	-21°32.9
14	41°36.7	60°18.1	-9°00.2	341°41.7	21°30.9	137°49.3	-22°40.8	110°05.4	-21°32.9
15	56°39.1	75°17.7	-8°59.2	356°42.4	21°31.3	152°51.7	-22°40.8	125°07.7	-21°32.9
16	71°41.6	90°17.3	-8°58.2	11°43.1	21°31.6	167°54.1	-22°40.8	140°10.1	-21°32.9
17	86°44.0	105°16.9	-8°57.1	26°43.8	21°32.0	182°56.5	-22°40.8	155°12.4	-21°32.9
18	101°46.5	120°16.5	-8°56.1	41°44.6	21°32.3	197°58.9	-22°40.8	170°14.8	-21°32.9
19	116°49.0	135°16.1	-8°55.0	56°45.3	21°32.7	213°01.3	-22°40.8	185°17.1	-21°32.9
20	131°51.4	150°15.7	-8°54.0	71°46.0	21°33.0	228°03.7	-22°40.8	200°19.5	-21°32.9
21	146°53.9	165°15.3	-8°52.9	86°46.7	21°33.3	243°06.1	-22°40.8	215°21.8	-21°32.8
22	161°56.4	180°14.9	-8°51.9	101°47.5	21°33.7	258°08.5	-22°40.8	230°24.2	-21°32.8
23	176°58.8	195°14.5	-8°50.8	116°48.2	21°34.0	273°10.9	-22°40.8	245°26.5	-21°32.8
Mer.pass.:11:14		v-0.4 d1.0 m-3.9		v0.7 d0.3 m1.5		v2.4 d-0.0 m-2.1		v2.3 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.3
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.1
Achernar	335°24.4	-57°08.6
Hamal	327°56.7	23°33.0
Polaris	316°26.5	89°20.8
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.7
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.8	46°01.1
Bellatrix	278°27.9	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.7
Betelgeuse	270°57.1	7°24.4
Canopus	263°54.5	-52°42.8
Sirius	258°30.2	-16°44.7
Adara	255°09.4	-29°00.3
Procyon	244°55.5	5°10.5
Pollux	243°22.7	27°58.7
Avior	234°16.2	-59°34.6
Suhail	222°49.3	-43°30.9
Miaplacidus	221°38.4	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.0	11°52.3
Dubhe	193°46.3	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.3
Gacrux	171°55.9	-57°13.2
Alioth	166°16.7	55°51.4
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.0
Hadar	148°41.7	-60°27.7
Menkent	148°02.6	-36°27.8
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.8	-60°54.6
Zubenelg.	137°00.8	-16°07.2
Kochab	137°19.1	74°04.5
Alphecca	126°07.4	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.3	-69°03.3
Sabik	102°07.9	-15°44.8
Shaula	96°16.5	-37°06.8
Rasalhague	96°02.7	12°32.7
Etamin	90°44.2	51°29.0
Kaus Aust.	83°38.5	-34°22.3
Vega	80°36.3	38°47.8
Nunki	75°53.5	-26°16.2
Altair	62°04.6	8°55.0
Peacock	53°13.3	-56°40.2
Deneb	49°29.0	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.2	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.9	28°11.0
Markab	13°34.7	15°18.3

2019/4/1	SHA	Mer.pass
Venus	21°39.6	09:57
Mars	301°52.5	15:15
Jupiter	96°17.1	04:58
Saturn	68°36.0	06:48

2019/4/2	SHA	Mer.pass
Venus	20°30.5	09:58
Mars	301°10.9	15:14
Jupiter	96°15.2	04:54
Saturn	68°33.1	06:45

2019/4/3	SHA	Mer.pass
Venus	19°21.6	09:59
Mars	300°29.3	15:13
Jupiter	96°13.5	04:50
Saturn	68°30.3	06:41

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°58.4	4°20.6	223°09.8	13.7	-16°15.5	7.6	54.1
1	193°58.6	4°21.6	237°42.6	13.8	-16°07.9	7.6	54.1
2	208°58.8	4°22.5	252°15.4	13.8	-16°00.2	7.7	54.1
3	223°58.9	4°23.5	266°48.2	13.8	-15°52.5	7.8	54.1
4	238°59.1	4°24.5	281°21.0	13.9	-15°44.7	7.8	54.1
5	253°59.3	4°25.4	295°53.9	13.9	-15°36.8	7.9	54.1
6	268°59.5	4°26.4	310°26.8	13.9	-15°28.9	8.0	54.1
7	283°59.7	4°27.4	324°59.8	14.0	-15°20.9	8.0	54.1
8	298°59.9	4°28.3	339°32.8	14.0	-15°12.8	8.1	54.1
9	314°00.1	4°29.3	354°05.8	14.0	-15°04.7	8.2	54.1
10	329°00.2	4°30.3	8°38.9	14.1	-14°56.5	8.2	54.1
11	344°00.4	4°31.2	23°11.9	14.1	-14°48.2	8.3	54.1
12	359°00.6	4°32.2	37°45.1	14.1	-14°39.9	8.4	54.1
13	14°00.8	4°33.2	52°18.2	14.2	-14°31.5	8.4	54.1
14	29°01.0	4°34.1	66°51.4	14.2	-14°23.0	8.5	54.1
15	44°01.2	4°35.1	81°24.6	14.2	-14°14.5	8.5	54.1
16	59°01.4	4°36.1	95°57.9	14.3	-14°05.9	8.6	54.1
17	74°01.5	4°37.0	110°31.1	14.3	-13°57.3	8.7	54.1
18	89°01.7	4°38.0	125°04.4	14.3	-13°48.6	8.7	54.1
19	104°01.9	4°39.0	139°37.8	14.3	-13°39.8	8.8	54.1
20	119°02.1	4°39.9	154°11.1	14.4	-13°31.0	8.8	54.1
21	134°02.3	4°40.9	168°44.5	14.4	-13°22.1	8.9	54.1
22	149°02.5	4°41.8	183°17.9	14.4	-13°13.2	9.0	54.1
23	164°02.6	4°42.8	197°51.4	14.5	-13°04.2	9.0	54.1
	SD.=16.0	d=1.0			S.D.=14.7		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°02.8	4°43.8	212°24.9	14.5	-12°55.1	9.1	54.1
1	194°03.0	4°44.7	226°58.4	14.5	-12°46.0	9.1	54.1
2	209°03.2	4°45.7	241°31.9	14.5	-12°36.9	9.2	54.1
3	224°03.4	4°46.7	256°05.5	14.6	-12°27.6	9.2	54.1
4	239°03.6	4°47.6	270°39.0	14.6	-12°18.4	9.3	54.1
5	254°03.8	4°48.6	285°12.7	14.6	-12°09.0	9.4	54.2
6	269°03.9	4°49.6	299°46.3	14.6	-11°59.7	9.4	54.2
7	284°04.1	4°50.5	314°19.9	14.7	-11°50.2	9.5	54.2
8	299°04.3	4°51.5	328°53.6	14.7	-11°40.7	9.5	54.2
9	314°04.5	4°52.4	343°27.3	14.7	-11°31.2	9.6	54.2
10	329°04.7	4°53.4	358°01.1	14.7	-11°21.6	9.6	54.2
11	344°04.9	4°54.4	12°34.8	14.8	-11°12.0	9.7	54.2
12	359°05.0	4°55.3	27°08.6	14.8	-11°02.3	9.7	54.2
13	14°05.2	4°56.3	41°42.4	14.8	-10°52.6	9.8	54.2
14	29°05.4	4°57.2	56°16.2	14.8	-10°42.8	9.8	54.2
15	44°05.6	4°58.2	70°50.0	14.8	-10°33.0	9.9	54.2
16	59°05.8	4°59.2	85°23.9	14.9	-10°23.1	9.9	54.2
17	74°06.0	5°00.1	99°57.7	14.9	-10°13.2	9.9	54.2
18	89°06.1	5°01.1	114°31.6	14.9	-10°03.2	10.0	54.3
19	104°06.3	5°02.1	129°05.5	14.9	-9°53.2	10.0	54.3
20	119°06.5	5°03.0	143°39.5	14.9	-9°43.1	10.1	54.3
21	134°06.7	5°04.0	158°13.4	15.0	-9°33.0	10.1	54.3
22	149°06.9	5°04.9	172°47.4	15.0	-9°22.9	10.2	54.3
23	164°07.1	5°05.9	187°21.4	15.0	-9°12.7	10.2	54.3
	SD.=16.0	d=1.0			S.D.=14.8		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°07.2	5°06.9	201°55.4	15.0	-9°02.5	10.2	54.3
1	194°07.4	5°07.8	216°29.4	15.0	-8°52.2	10.3	54.3
2	209°07.6	5°08.8	231°03.4	15.0	-8°41.9	10.3	54.3
3	224°07.8	5°09.7	245°37.4	15.0	-8°31.5	10.4	54.3
4	239°08.0	5°10.7	260°11.5	15.1	-8°21.1	10.4	54.3
5	254°08.2	5°11.6	274°45.5	15.1	-8°10.7	10.4	54.4
6	269°08.3	5°12.6	289°19.6	15.1	-8°00.2	10.5	54.4
7	284°08.5	5°13.6	303°53.7	15.1	-7°49.7	10.5	54.4
8	299°08.7	5°14.5	318°27.8	15.1	-7°39.2	10.6	54.4
9	314°08.9	5°15.5	333°01.9	15.1	-7°28.6	10.6	54.4
10	329°09.1	5°16.4	347°36.0	15.1	-7°18.0	10.6	54.4
11	344°09.3	5°17.4	2°10.1	15.1	-7°07.4	10.7	54.4
12	359°09.4	5°18.4	16°44.3	15.1	-6°56.7	10.7	54.4
13	14°09.6	5°19.3	31°18.4	15.1	-6°46.0	10.7	54.4
14	29°09.8	5°20.3	45°52.6	15.2	-6°35.2	10.8	54.5
15	44°10.0	5°21.2	60°26.7	15.2	-6°24.4	10.8	54.5
16	59°10.2	5°22.2	75°00.9	15.2	-6°13.6	10.8	54.5
17	74°10.3	5°23.1	89°35.0	15.2	-6°02.8	10.9	54.5
18	89°10.5	5°24.1	104°09.2	15.2	-5°51.9	10.9	54.5
19	104°10.7	5°25.1	118°43.4	15.2	-5°41.0	10.9	54.5
20	119°10.9	5°26.0	133°17.6	15.2	-5°30.1	10.9	54.5
21	134°11.1	5°27.0	147°51.8	15.2	-5°19.1	11.0	54.5
22	149°11.3	5°27.9	162°25.9	15.2	-5°08.1	11.0	54.6
23	164°11.4	5°28.9	177°00.1	15.2	-4°57.1	11.0	54.6
	SD.=16.0	d=1.0			S.D.=14.8		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	01:29	03:37	04:52	19:18	20:34	22:51
70	02:16	03:54	05:00	19:10	20:17	21:58
68	02:45	04:07	05:07	19:03	20:03	21:27
66	03:06	04:18	05:12	18:58	19:52	21:05
64	03:22	04:27	05:16	18:53	19:43	20:48
62	03:36	04:34	05:20	18:49	19:35	20:34
60	03:47	04:41	05:23	18:45	19:29	20:23
58	03:56	04:46	05:26	18:42	19:23	20:13
56	04:04	04:51	05:29	18:40	19:18	20:05
54	04:12	04:55	05:31	18:37	19:13	19:57
52	04:18	04:59	05:34	18:35	19:09	19:51
50	04:23	05:03	05:35	18:33	19:06	19:45
45	04:35	05:10	05:40	18:29	18:58	19:34
40	04:44	05:16	05:43	18:25	18:52	19:25
35	04:51	05:21	05:46	18:22	18:47	19:17
30	04:56	05:25	05:49	18:19	18:43	19:11
20	05:05	05:31	05:53	18:14	18:37	19:02
10	05:11	05:36	05:57	18:11	18:32	18:56
0	05:16	05:40	06:00	18:07	18:28	18:52
-10	05:18	05:43	06:04	18:03	18:24	18:49
-20	05:20	05:45	06:07	17:60	18:22	18:47
-30	05:19	05:47	06:11	17:56	18:20	18:47
-35	05:19	05:48	06:13	17:54	18:19	18:48
-40	05:17	05:49	06:16	17:51	18:18	18:49
-45	05:15	05:49	06:18	17:48	18:17	18:51
-50	05:12	05:49	06:22	17:45	18:17	18:54
-52	05:10	05:49	06:23	17:43	18:17	18:56
-54	05:08	05:49	06:25	17:42	18:17	18:58
-56	05:06	05:49	06:27	17:40	18:17	18:60
-58	05:04	05:49	06:28	17:38	18:17	19:02
-60	05:01	05:49	06:31	17:35	18:17	19:05

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	07:12	06:45	06:26	11:52	13:50	15:39
70	06:38	06:25	06:15	12:25	14:09	15:48
68	06:13	06:09	06:05	12:49	14:24	15:56
66	05:53	05:56	05:57	13:08	14:35	16:02
64	05:37	05:45	05:51	13:23	14:45	16:08
62	05:24	05:36	05:45	13:35	14:54	16:12
60	05:13	05:28	05:40	13:46	15:01	16:16
58	05:03	05:21	05:35	13:55	15:07	16:20
56	04:55	05:14	05:31	14:03	15:12	16:23
54	04:47	05:09	05:28	14:10	15:17	16:26
52	04:41	05:04	05:24	14:16	15:22	16:28
50	04:34	04:59	05:21	14:22	15:26	16:31
45	04:21	04:49	05:15	14:34	15:35	16:36
40	04:10	04:41	05:09	14:44	15:42	16:40
35	04:01	04:34	05:05	14:53	15:48	16:44
30	03:52	04:27	05:00	15:00	15:53	16:47
20	03:38	04:16	04:53	15:13	16:03	16:52
10	03:25	04:07	04:47	15:24	16:11	16:57
0	03:14	03:58	04:41	15:35	16:19	17:01
-10	03:02	03:49	04:35	15:46	16:26	17:06
-20	02:49	03:39	04:28	15:57	16:34	17:10
-30	02:35	03:28	04:21	16:09	16:43	17:16
-35	02:26	03:21	04:17	16:17	16:48	17:19
-40	02:16	03:14	04:12	16:25	16:54	17:22
-45	02:05	03:05	04:06	16:34	17:01	17:26
-50	01:51	02:55	03:59	16:46	17:09	17:31
-52	01:45	02:50	03:56	16:51	17:13	17:33
-54	01:38	02:45	03:53	16:57	17:17	17:35
-56	01:30	02:39	03:49	17:04	17:22	17:38
-58	01:21	02:32	03:45	17:11	17:27	17:40
-60	01:10	02:25	03:40	17:19	17:32	17:44

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	04:06	03:57	12:03	09:24	21:46	26(13%)
2	03:49	03:40	12:03	10:08	22:29	27(8%)
3	03:31	03:22	12:03	10:51	23:12	28(3%)

April 04, 05 ,06 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	192°01.3	210°14.1	-8°49.8	131°48.9	21°34.4	288°13.4	-22°40.8	260°28.9	-21°32.8
1	207°03.8	225°13.7	-8°48.7	146°49.6	21°34.7	303°15.8	-22°40.8	275°31.2	-21°32.8
2	222°06.2	240°13.3	-8°47.7	161°50.4	21°35.0	318°18.2	-22°40.8	290°33.6	-21°32.8
3	237°08.7	255°12.9	-8°46.6	176°51.1	21°35.4	333°20.6	-22°40.8	305°35.9	-21°32.8
4	252°11.1	270°12.5	-8°45.6	191°51.8	21°35.7	348°23.0	-22°40.8	320°38.3	-21°32.7
5	267°13.6	285°12.1	-8°44.5	206°52.6	21°36.1	3°25.4	-22°40.8	335°40.6	-21°32.7
6	282°16.1	300°11.7	-8°43.5	221°53.3	21°36.4	18°27.8	-22°40.8	350°43.0	-21°32.7
7	297°18.5	315°11.3	-8°42.4	236°54.0	21°36.8	33°30.2	-22°40.8	5°45.4	-21°32.7
8	312°21.0	330°10.9	-8°41.4	251°54.7	21°37.1	48°32.6	-22°40.8	20°47.7	-21°32.7
9	327°23.5	345°10.5	-8°40.3	266°55.5	21°37.4	63°35.0	-22°40.8	35°50.1	-21°32.7
10	342°25.9	0°10.1	-8°39.3	281°56.2	21°37.8	78°37.4	-22°40.8	50°52.4	-21°32.7
11	357°28.4	15°09.7	-8°38.2	296°56.9	21°38.1	93°39.9	-22°40.8	65°54.8	-21°32.6
12	12°30.9	30°09.3	-8°37.2	311°57.6	21°38.4	108°42.3	-22°40.8	80°57.1	-21°32.6
13	27°33.3	45°08.9	-8°36.1	326°58.4	21°38.8	123°44.7	-22°40.8	95°59.5	-21°32.6
14	42°35.8	60°08.5	-8°35.1	341°59.1	21°39.1	138°47.1	-22°40.8	111°01.8	-21°32.6
15	57°38.3	75°08.1	-8°34.0	356°59.8	21°39.5	153°49.5	-22°40.8	126°04.2	-21°32.6
16	72°40.7	90°07.7	-8°33.0	12°00.5	21°39.8	168°51.9	-22°40.8	141°06.5	-21°32.6
17	87°43.2	105°07.3	-8°31.9	27°01.3	21°40.1	183°54.3	-22°40.8	156°08.9	-21°32.6
18	102°45.6	120°06.9	-8°30.9	42°02.0	21°40.5	198°56.7	-22°40.8	171°11.3	-21°32.6
19	117°48.1	135°06.5	-8°29.8	57°02.7	21°40.8	213°59.2	-22°40.8	186°13.6	-21°32.5
20	132°50.6	150°06.2	-8°28.8	72°03.4	21°41.1	229°01.6	-22°40.8	201°16.0	-21°32.5
21	147°53.0	165°05.8	-8°27.7	87°04.1	21°41.5	244°04.0	-22°40.8	216°18.3	-21°32.5
22	162°55.5	180°05.4	-8°26.6	102°04.9	21°41.8	259°06.4	-22°40.8	231°20.7	-21°32.5
23	177°58.0	195°05.0	-8°25.6	117°05.6	21°42.2	274°08.8	-22°40.8	246°23.0	-21°32.5
Mer.pass.:11:10		v-0.4 d1.0 m-3.9		v0.7 d0.3 m1.5		v2.4 d-0.0 m-2.1		v2.4 d0.0 m0.6	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	193°00.4	210°04.6	-8°24.5	132°06.3	21°42.5	289°11.2	-22°40.8	261°25.4	-21°32.5
1	208°02.9	225°04.2	-8°23.5	147°07.0	21°42.8	304°13.6	-22°40.8	276°27.7	-21°32.5
2	223°05.4	240°03.8	-8°22.4	162°07.8	21°43.2	319°16.1	-22°40.8	291°30.1	-21°32.4
3	238°07.8	255°03.4	-8°21.4	177°08.5	21°43.5	334°18.5	-22°40.8	306°32.5	-21°32.4
4	253°10.3	270°03.0	-8°20.3	192°09.2	21°43.8	349°20.9	-22°40.8	321°34.8	-21°32.4
5	268°12.7	285°02.6	-8°19.2	207°09.9	21°44.2	4°23.3	-22°40.8	336°37.2	-21°32.4
6	283°15.2	300°02.2	-8°18.2	222°10.7	21°44.5	19°25.7	-22°40.8	351°39.5	-21°32.4
7	298°17.7	315°01.8	-8°17.1	237°11.4	21°44.8	34°28.1	-22°40.8	6°41.9	-21°32.4
8	313°20.1	330°01.4	-8°16.1	252°12.1	21°45.2	49°30.6	-22°40.8	21°44.3	-21°32.4
9	328°22.6	345°01.1	-8°15.0	267°12.8	21°45.5	64°33.0	-22°40.8	36°46.6	-21°32.4
10	343°25.1	0°00.7	-8°13.9	282°13.6	21°45.8	79°35.4	-22°40.8	51°49.0	-21°32.3
11	358°27.5	15°00.3	-8°12.9	297°14.3	21°46.1	94°37.8	-22°40.8	66°51.3	-21°32.3
12	13°30.0	29°59.9	-8°11.8	312°15.0	21°46.5	109°40.2	-22°40.8	81°53.7	-21°32.3
13	28°32.5	44°59.5	-8°10.7	327°15.7	21°46.8	124°42.7	-22°40.8	96°56.0	-21°32.3
14	43°34.9	59°59.1	-8°09.7	342°16.4	21°47.1	139°45.1	-22°40.8	111°58.4	-21°32.3
15	58°37.4	74°58.7	-8°08.6	357°17.2	21°47.5	154°47.5	-22°40.8	127°00.8	-21°32.3
16	73°39.9	89°58.3	-8°07.6	12°17.9	21°47.8	169°49.9	-22°40.8	142°03.1	-21°32.3
17	88°42.3	104°57.9	-8°06.5	27°18.6	21°48.1	184°52.3	-22°40.8	157°05.5	-21°32.3
18	103°44.8	119°57.6	-8°05.4	42°19.3	21°48.5	199°54.8	-22°40.8	172°07.8	-21°32.2
19	118°47.2	134°57.2	-8°04.4	57°20.1	21°48.8	214°57.2	-22°40.8	187°10.2	-21°32.2
20	133°49.7	149°56.8	-8°03.3	72°20.8	21°49.1	229°59.6	-22°40.8	202°12.6	-21°32.2
21	148°52.2	164°56.4	-8°02.2	87°21.5	21°49.4	245°02.0	-22°40.9	217°14.9	-21°32.2
22	163°54.6	179°56.0	-8°01.2	102°22.2	21°49.8	260°04.5	-22°40.9	232°17.3	-21°32.2
23	178°57.1	194°55.6	-8°00.1	117°22.9	21°50.1	275°06.9	-22°40.9	247°19.6	-21°32.2
Mer.pass.:11:06		v-0.4 d1.1 m-3.9		v0.7 d0.3 m1.5		v2.4 d-0.0 m-2.1		v2.4 d0.0 m0.6	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	193°59.6	209°55.2	-7°59.0	132°23.7	21°50.4	290°09.3	-22°40.9	262°22.0	-21°32.2
1	209°02.0	224°54.8	-7°58.0	147°24.4	21°50.8	305°11.7	-22°40.9	277°24.4	-21°32.2
2	224°04.5	239°54.5	-7°56.9	162°25.1	21°51.1	320°14.2	-22°40.9	292°26.7	-21°32.1
3	239°07.0	254°54.1	-7°55.8	177°25.8	21°51.4	335°16.6	-22°40.9	307°29.1	-21°32.1
4	254°09.4	269°53.7	-7°54.7	192°26.5	21°51.7	350°19.0	-22°40.9	322°31.4	-21°32.1
5	269°11.9	284°53.3	-7°53.7	207°27.3	21°52.1	5°21.4	-22°40.9	337°33.8	-21°32.1
6	284°14.3	299°52.9	-7°52.6	222°28.0	21°52.4	20°23.9	-22°40.9	352°36.2	-21°32.1
7	299°16.8	314°52.5	-7°51.5	237°28.7	21°52.7	35°26.3	-22°40.9	7°38.5	-21°32.1
8	314°19.3	329°52.2	-7°50.5	252°29.4	21°53.0	50°28.7	-22°40.9	22°40.9	-21°32.1
9	329°21.7	344°51.8	-7°49.4	267°30.2	21°53.4	65°31.1	-22°40.9	37°43.3	-21°32.1
10	344°24.2	359°51.4	-7°48.3	282°30.9	21°53.7	80°33.6	-22°40.9	52°45.6	-21°32.0
11	359°26.7	14°51.0	-7°47.3	297°31.6	21°54.0	95°36.0	-22°40.9	67°48.0	-21°32.0
12	14°29.1	29°50.6	-7°46.2	312°32.3	21°54.3	110°38.4	-22°40.9	82°50.3	-21°32.0
13	29°31.6	44°50.2	-7°45.1	327°33.0	21°54.7	125°40.8	-22°40.9	97°52.7	-21°32.0
14	44°34.1	59°49.9	-7°44.0	342°33.8	21°55.0	140°43.3	-22°40.9	112°55.1	-21°32.0
15	59°36.5	74°49.5	-7°43.0	357°34.5	21°55.3	155°45.7	-22°40.9	127°57.4	-21°32.0
16	74°39.0	89°49.1	-7°41.9	12°35.2	21°55.6	170°48.1	-22°40.9	142°59.8	-21°32.0
17	89°41.5	104°48.7	-7°40.8	27°35.9	21°55.9	185°50.6	-22°40.9	158°02.2	-21°32.0
18	104°43.9	119°48.3	-7°39.7	42°36.6	21°56.3	200°53.0	-22°40.9	173°04.5	-21°31.9
19	119°46.4	134°47.9	-7°38.7	57°37.4	21°56.6	215°55.4	-22°40.9	188°06.9	-21°31.9
20	134°48.8	149°47.6	-7°37.6	72°38.1	21°56.9	230°57.9	-22°40.9	203°09.3	-21°31.9
21	149°51.3	164°47.2	-7°36.5	87°38.8	21°57.2	246°00.3	-22°40.9	218°11.6	-21°31.9
22	164°53.8	179°46.8	-7°35.4	102°39.5	21°57.6	261°02.7	-22°40.9	233°14.0	-21°31.9
23	179°56.2	194°46.4	-7°34.4	117°40.2	21°57.9	276°05.2	-22°40.9	248°16.4	-21°31.9
Mer.pass.:11:02		v-0.4 d1.1 m-3.9		v0.7 d0.3 m1.5		v2.4 d-0.0 m-2.1		v2.4 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.3
Schedar	349°36.6	56°38.4
Diphda	348°52.2	-17°53.1
Achernar	335°24.4	-57°08.6
Hamal	327°56.7	23°33.0
Polaris	316°27.4	89°20.7
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.8	46°01.0
Bellatrix	278°27.9	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.7
Betelgeuse	270°57.1	7°24.4
Canopus	263°54.5	-52°42.8
Sirius	258°30.2	-16°44.7
Adara	255°09.4	-29°00.3
Procyon	244°55.5	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.2	-59°34.6
Suhail	222°49.3	-43°30.9
Miaplacidus	221°38.4	-69°48.0
Alphard	217°52.0	-8°44.7
Regulus	207°39.1	11°52.3
Dubhe	193°46.3	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.3
Gacrux	171°55.9	-57°13.2
Alioth	166°16.7	55°51.4
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.0
Hadar	148°41.7	-60°27.8
Menkent	148°02.6	-36°27.8
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.8	-60°54.6
Zubenelg.	137°00.8	-16°07.2
Kochab	137°19.1	74°04.5
Alphecca	126°07.4	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.2	-69°03.3
Sabik	102°07.9	-15°44.8
Shaula	96°16.4	-37°06.8
Rasalhague	96°02.7	12°32.7
Etamin	90°44.2	51°29.0
Kaus Aust.	83°38.5	-34°22.3
Vega	80°36.3	38°47.8
Nunki	75°53.4	-26°16.2
Altair	62°04.5	8°55.0
Peacock	53°13.3	-56°40.1
Deneb	49°29.0	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.2	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.9	28°11.0
Markab	13°34.7	15°18.3

2019/4/4	SHA	Mer.pass
Venus	18°12.8	09:59
Mars	299°47.6	15:12
Jupiter	96°12.1	04:46
Saturn	68°27.6	06:37

2019/4/5	SHA	Mer.pass
Venus	17°04.2	09:60
Mars	299°05.9	15:11
Jupiter	96°10.8	04:42
Saturn	68°25.0	06:33

2019/4/6	SHA	Mer.pass
Venus	15°55.7	10:01
Mars	298°24.1	15:10
Jupiter	96°09.7	04:39
Saturn	68°22.4	06:30

Horizontal paralax	
Venus:	0.1
Mars:	0.1

Thu	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
0	179°11.6	5°29.8	191°34.3	15.2	-4°46.1	11.1	54.6
1	194°11.8	5°30.8	206°08.5	15.2	-4°35.0	11.1	54.6
2	209°12.0	5°31.8	220°42.7	15.2	-4°23.9	11.1	54.6
3	224°12.2	5°32.7	235°16.9	15.2	-4°12.8	11.1	54.6
4	239°12.3	5°33.7	249°51.1	15.2	-4°01.6	11.2	54.6
5	254°12.5	5°34.6	264°25.3	15.2	-3°50.5	11.2	54.7
6	269°12.7	5°35.6	278°59.4	15.2	-3°39.3	11.2	54.7
7	284°12.9	5°36.5	293°33.6	15.2	-3°28.1	11.2	54.7
8	299°13.1	5°37.5	308°07.8	15.2	-3°16.9	11.2	54.7
9	314°13.2	5°38.4	322°42.0	15.2	-3°05.6	11.3	54.7
10	329°13.4	5°39.4	337°16.1	15.2	-2°54.3	11.3	54.7
11	344°13.6	5°40.3	351°50.3	15.2	-2°43.1	11.3	54.7
12	359°13.8	5°41.3	6°24.4	15.1	-2°31.8	11.3	54.8
13	14°14.0	5°42.3	20°58.6	15.1	-2°20.4	11.3	54.8
14	29°14.2	5°43.2	35°32.7	15.1	-2°09.1	11.3	54.8
15	44°14.3	5°44.2	50°06.8	15.1	-1°57.7	11.4	54.8
16	59°14.5	5°45.1	64°40.9	15.1	-1°46.4	11.4	54.8
17	74°14.7	5°46.1	79°15.0	15.1	-1°35.0	11.4	54.8
18	89°14.9	5°47.0	93°49.1	15.1	-1°23.6	11.4	54.8
19	104°15.1	5°48.0	108°23.2	15.1	-1°12.2	11.4	54.9
20	119°15.2	5°48.9	122°57.3	15.1	-1°00.8	11.4	54.9
21	134°15.4	5°49.9	137°31.3	15.0	-0°49.3	11.4	54.9
22	149°15.6	5°50.8	152°05.4	15.0	-0°37.9	11.4	54.9
23	164°15.8	5°51.8	166°39.4	15.0	-0°26.5	11.5	54.9
	SD.=16.0	d=1.0			S.D.=14.9		

Fri	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
0	179°16.0	5°52.7	181°13.4	15.0	-0°15.0	11.5	54.9
1	194°16.1	5°53.7	195°47.4	15.0	-0°03.5	11.5	55.0
2	209°16.3	5°54.6	210°21.4	15.0	0°07.9	11.5	55.0
3	224°16.5	5°55.6	224°55.4	15.0	0°19.4	11.5	55.0
4	239°16.7	5°56.5	239°29.3	14.9	0°30.9	11.5	55.0
5	254°16.8	5°57.5	254°03.2	14.9	0°42.4	11.5	55.0
6	269°17.0	5°58.4	268°37.1	14.9	0°53.9	11.5	55.0
7	284°17.2	5°59.4	283°11.0	14.9	1°05.4	11.5	55.1
8	299°17.4	6°00.3	297°44.9	14.9	1°16.9	11.5	55.1
9	314°17.6	6°01.3	312°18.7	14.8	1°28.4	11.5	55.1
10	329°17.7	6°02.2	326°52.5	14.8	1°39.9	11.5	55.1
11	344°17.9	6°03.2	341°26.3	14.8	1°51.4	11.5	55.1
12	359°18.1	6°04.1	356°00.1	14.8	2°02.9	11.5	55.1
13	14°18.3	6°05.1	10°33.9	14.7	2°14.4	11.5	55.2
14	29°18.5	6°06.0	25°07.6	14.7	2°26.0	11.5	55.2
15	44°18.6	6°07.0	39°41.3	14.7	2°37.5	11.5	55.2
16	59°18.8	6°07.9	54°15.0	14.7	2°49.0	11.5	55.2
17	74°19.0	6°08.9	68°48.6	14.6	3°00.4	11.5	55.2
18	89°19.2	6°09.8	83°22.2	14.6	3°11.9	11.5	55.2
19	104°19.4	6°10.8	97°55.8	14.6	3°23.4	11.5	55.3
20	119°19.5	6°11.7	112°29.4	14.5	3°34.9	11.5	55.3
21	134°19.7	6°12.7	127°02.9	14.5	3°46.4	11.5	55.3
22	149°19.9	6°13.6	141°36.4	14.5	3°57.8	11.5	55.3
23	164°20.1	6°14.6	156°09.9	14.5	4°09.3	11.4	55.3
	SD.=16.0	d=1.0			S.D.=15.0		

Sat	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
0	179°20.2	6°15.5	170°43.3	14.4	4°20.7	11.4	55.3
1	194°20.4	6°16.5	185°16.7	14.4	4°32.1	11.4	55.4
2	209°20.6	6°17.4	199°50.1	14.4	4°43.6	11.4	55.4
3	224°20.8	6°18.4	214°23.4	14.3	4°55.0	11.4	55.4
4	239°21.0	6°19.3	228°56.7	14.3	5°06.4	11.4	55.4
5	254°21.1	6°20.3	243°30.0	14.2	5°17.7	11.4	55.4
6	269°21.3	6°21.2	258°03.2	14.2	5°29.1	11.4	55.5
7	284°21.5	6°22.1	272°36.4	14.2	5°40.5	11.3	55.5
8	299°21.7	6°23.1	287°09.6	14.1	5°51.8	11.3	55.5
9	314°21.8	6°24.0	301°42.7	14.1	6°03.1	11.3	55.5
10	329°22.0	6°25.0	316°15.8	14.1	6°14.4	11.3	55.5
11	344°22.2	6°25.9	330°48.8	14.0	6°25.7	11.3	55.5
12	359°22.4	6°26.9	345°21.8	14.0	6°36.9	11.2	55.6
13	14°22.5	6°27.8	359°54.8	13.9	6°48.1	11.2	55.6
14	29°22.7	6°28.8	14°27.7	13.9	6°59.4	11.2	55.6
15	44°22.9	6°29.7	29°00.6	13.9	7°10.5	11.2	55.6
16	59°23.1	6°30.7	43°33.4	13.8	7°21.7	11.1	55.6
17	74°23.3	6°31.6	58°06.2	13.8	7°32.8	11.1	55.7
18	89°23.4	6°32.5	72°38.9	13.7	7°44.0	11.1	55.7
19	104°23.6	6°33.5	87°11.6	13.7	7°55.0	11.1	55.7
20	119°23.8	6°34.4	101°44.3	13.6	8°06.1	11.0	55.7
21	134°24.0	6°35.4	116°16.9	13.6	8°17.1	11.0	55.7
22	149°24.1	6°36.3	130°49.4	13.5	8°28.1	11.0	55.8
23	164°24.3	6°37.3	145°21.9	13.5	8°39.1	11.0	55.8
	SD.=16.0	d=0.9			S.D.=15.1		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	00:29	03:18	04:37	19:32	20:52	–:–
70	01:49	03:37	04:46	19:22	20:32	22:26
68	02:25	03:53	04:54	19:14	20:16	21:46
66	02:50	04:05	05:00	19:08	20:03	21:20
64	03:08	04:15	05:06	19:02	19:53	21:00
62	03:24	04:24	05:10	18:57	19:44	20:45
60	03:36	04:31	05:14	18:53	19:37	20:32
58	03:46	04:37	05:18	18:49	19:30	20:21
56	03:55	04:43	05:21	18:46	19:24	20:12
54	04:03	04:48	05:24	18:43	19:19	20:04
52	04:10	04:52	05:27	18:40	19:15	19:57
50	04:16	04:56	05:29	18:38	19:11	19:51
45	04:29	05:04	05:34	18:32	19:02	19:38
40	04:38	05:11	05:38	18:28	18:55	19:28
35	04:46	05:16	05:42	18:24	18:50	19:20
30	04:53	05:21	05:45	18:21	18:45	19:13
20	05:03	05:28	05:51	18:15	18:38	19:03
10	05:10	05:34	05:55	18:10	18:32	18:56
0	05:15	05:39	05:60	18:06	18:27	18:51
-10	05:18	05:43	06:04	18:02	18:23	18:47
-20	05:20	05:46	06:08	17:57	18:19	18:45
-30	05:21	05:49	06:13	17:52	18:16	18:44
-35	05:21	05:50	06:16	17:49	18:15	18:44
-40	05:20	05:52	06:19	17:46	18:13	18:45
-45	05:19	05:53	06:22	17:43	18:12	18:46
-50	05:17	05:54	06:26	17:38	18:11	18:48
-52	05:15	05:54	06:28	17:36	18:10	18:49
-54	05:14	05:55	06:30	17:34	18:10	18:50
-56	05:12	05:55	06:33	17:32	18:09	18:52
-58	05:10	05:56	06:35	17:29	18:09	18:54
-60	05:08	05:56	06:38	17:26	18:08	18:56

Lat.	Moonrise Thu	Moonrise Fri	Moonrise Sat	Moonset Thu	Moonset Fri	Moonset Sat
72	06:11	05:56	05:41	17:24	19:10	20:60
70	06:06	05:57	05:48	17:26	19:05	20:47
68	06:01	05:58	05:54	17:28	19:01	20:37
66	05:58	05:58	05:59	17:30	18:58	20:28
64	05:55	05:59	06:03	17:31	18:55	20:21
62	05:52	05:60	06:07	17:32	18:53	20:15
60	05:50	06:00	06:10	17:33	18:51	20:10
58	05:48	06:01	06:13	17:34	18:49	20:05
56	05:46	06:01	06:16	17:35	18:47	20:01
54	05:45	06:01	06:18	17:35	18:46	19:57
52	05:43	06:02	06:20	17:36	18:44	19:54
50	05:42	06:02	06:22	17:36	18:43	19:51
45	05:39	06:03	06:27	17:38	18:40	19:44
40	05:36	06:03	06:30	17:39	18:38	19:39
35	05:34	06:04	06:34	17:40	18:36	19:34
30	05:32	06:04	06:36	17:40	18:35	19:30
20	05:29	06:05	06:41	17:42	18:32	19:23
10	05:26	06:05	06:46	17:43	18:29	19:17
0	05:23	06:06	06:50	17:44	18:27	19:11
-10	05:21	06:07	06:54	17:45	18:25	19:05
-20	05:18	06:08	06:58	17:46	18:22	18:59
-30	05:14	06:08	07:03	17:47	18:19	18:52
-35	05:12	06:09	07:06	17:48	18:17	18:48
-40	05:10	06:09	07:10	17:49	18:16	18:44
-45	05:08	06:10	07:14	17:50	18:13	18:38
-50	05:05	06:11	07:18	17:51	18:11	18:32
-52	05:03	06:11	07:20	17:51	18:10	18:29
-54	05:02	06:12	07:23	17:52	18:08	18:26
-56	05:00	06:12	07:25	17:52	18:07	18:22
-58	04:58	06:13	07:28	17:53	18:05	18:19
-60	04:56	06:13	07:32	17:54	18:04	18:14

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
4	03:13	03:05	12:03	11:33	23:54	29(1%)
5	02:56	02:48	12:02	12:16	00:38	0(0%)
6	02:39	02:30	12:02	13:00	00:38	1(1%)

April 07, 08 ,09 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	194°58.7	209°46.0	-7°33.3	132°41.0	21°58.2	291°07.6	-22°40.9	263°18.7	-21°31.9
1	210°01.2	224°45.7	-7°32.2	147°41.7	21°58.5	306°10.0	-22°40.9	278°21.1	-21°31.9
2	225°03.6	239°45.3	-7°31.1	162°42.4	21°58.8	321°12.5	-22°40.9	293°23.4	-21°31.8
3	240°06.1	254°44.9	-7°30.1	177°43.1	21°59.1	336°14.9	-22°40.9	308°25.8	-21°31.8
4	255°08.6	269°44.5	-7°29.0	192°43.8	21°59.5	351°17.3	-22°40.9	323°28.2	-21°31.8
5	270°11.0	284°44.1	-7°27.9	207°44.5	21°59.8	6°19.8	-22°40.9	338°30.5	-21°31.8
6	285°13.5	299°43.8	-7°26.8	222°45.3	22°00.1	21°22.2	-22°40.9	353°32.9	-21°31.8
7	300°16.0	314°43.4	-7°25.7	237°46.0	22°00.4	36°24.6	-22°40.9	8°35.3	-21°31.8
8	315°18.4	329°43.0	-7°24.7	252°46.7	22°00.7	51°27.1	-22°40.9	23°37.6	-21°31.8
9	330°20.9	344°42.6	-7°23.6	267°47.4	22°01.1	66°29.5	-22°40.9	38°40.0	-21°31.8
10	345°23.3	359°42.2	-7°22.5	282°48.1	22°01.4	81°31.9	-22°40.9	53°42.4	-21°31.7
11	0°25.8	14°41.9	-7°21.4	297°48.9	22°01.7	96°34.4	-22°40.9	68°44.7	-21°31.7
12	15°28.3	29°41.5	-7°20.3	312°49.6	22°02.0	111°36.8	-22°40.9	83°47.1	-21°31.7
13	30°30.7	44°41.1	-7°19.3	327°50.3	22°02.3	126°39.2	-22°40.9	98°49.5	-21°31.7
14	45°33.2	59°40.7	-7°18.2	342°51.0	22°02.6	141°41.7	-22°40.9	113°51.8	-21°31.7
15	60°35.7	74°40.4	-7°17.1	357°51.7	22°03.0	156°44.1	-22°40.9	128°54.2	-21°31.7
16	75°38.1	89°40.0	-7°16.0	12°52.4	22°03.3	171°46.6	-22°40.9	143°56.6	-21°31.7
17	90°40.6	104°39.6	-7°14.9	27°53.2	22°03.6	186°49.0	-22°40.9	158°58.9	-21°31.7
18	105°43.1	119°39.2	-7°13.8	42°53.9	22°03.9	201°51.4	-22°40.9	174°01.3	-21°31.7
19	120°45.5	134°38.8	-7°12.8	57°54.6	22°04.2	216°53.9	-22°40.9	189°03.7	-21°31.6
20	135°48.0	149°38.5	-7°11.7	72°55.3	22°04.5	231°56.3	-22°40.9	204°06.1	-21°31.6
21	150°50.4	164°38.1	-7°10.6	87°56.0	22°04.8	246°58.7	-22°40.9	219°08.4	-21°31.6
22	165°52.9	179°37.7	-7°09.5	102°56.8	22°05.1	262°01.2	-22°40.9	234°10.8	-21°31.6
23	180°55.4	194°37.3	-7°08.4	117°57.5	22°05.5	277°03.6	-22°40.9	249°13.2	-21°31.6
Mer.pass.:10:58		v-0.4 d1.1 m-3.9		v0.7 d0.3 m1.5		v2.4 d-0.0 m-2.1		v2.4 d0.0 m0.6	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	195°57.8	209°37.0	-7°07.3	132°58.2	22°05.8	292°06.1	-22°40.9	264°15.5	-21°31.6
1	211°00.3	224°36.6	-7°06.2	147°58.9	22°06.1	307°08.5	-22°40.9	279°17.9	-21°31.6
2	226°02.8	239°36.2	-7°05.2	162°59.6	22°06.4	322°11.0	-22°40.9	294°20.3	-21°31.6
3	241°05.2	254°35.8	-7°04.1	178°00.3	22°06.7	337°13.4	-22°40.9	309°22.6	-21°31.5
4	256°07.7	269°35.5	-7°03.0	193°01.1	22°07.0	352°15.8	-22°40.9	324°25.0	-21°31.5
5	271°10.2	284°35.1	-7°01.9	208°01.8	22°07.3	7°18.3	-22°40.9	339°27.4	-21°31.5
6	286°12.6	299°34.7	-7°00.8	223°02.5	22°07.6	22°20.7	-22°40.9	354°29.7	-21°31.5
7	301°15.1	314°34.4	-6°59.7	238°03.2	22°08.0	37°23.2	-22°40.9	9°32.1	-21°31.5
8	316°17.6	329°34.0	-6°58.6	253°03.9	22°08.3	52°25.6	-22°40.9	24°34.5	-21°31.5
9	331°20.0	344°33.6	-6°57.5	268°04.6	22°08.6	67°28.1	-22°40.9	39°36.9	-21°31.5
10	346°22.5	359°33.2	-6°56.4	283°05.4	22°08.9	82°30.5	-22°40.9	54°39.2	-21°31.5
11	1°24.9	14°32.9	-6°55.4	298°06.1	22°09.2	97°32.9	-22°40.9	69°41.6	-21°31.5
12	16°27.4	29°32.5	-6°54.3	313°06.8	22°09.5	112°35.4	-22°40.9	84°44.0	-21°31.4
13	31°29.9	44°32.1	-6°53.2	328°07.5	22°09.8	127°37.8	-22°40.9	99°46.3	-21°31.4
14	46°32.3	59°31.7	-6°52.1	343°08.2	22°10.1	142°40.3	-22°40.9	114°48.7	-21°31.4
15	61°34.8	74°31.4	-6°51.0	358°08.9	22°10.4	157°42.7	-22°40.9	129°51.1	-21°31.4
16	76°37.3	89°31.0	-6°49.9	13°09.6	22°10.7	172°45.2	-22°40.9	144°53.5	-21°31.4
17	91°39.7	104°30.6	-6°48.8	28°10.4	22°11.0	187°47.6	-22°40.9	159°55.8	-21°31.4
18	106°42.2	119°30.3	-6°47.7	43°11.1	22°11.3	202°50.1	-22°40.9	174°58.2	-21°31.4
19	121°44.7	134°29.9	-6°46.6	58°11.8	22°11.7	217°52.5	-22°40.9	190°00.6	-21°31.4
20	136°47.1	149°29.5	-6°45.5	73°12.5	22°12.0	232°55.0	-22°40.9	205°02.9	-21°31.4
21	151°49.6	164°29.1	-6°44.4	88°13.2	22°12.3	247°57.4	-22°40.9	220°05.3	-21°31.3
22	166°52.1	179°28.8	-6°43.3	103°13.9	22°12.6	262°59.9	-22°40.9	235°07.7	-21°31.3
23	181°54.5	194°28.4	-6°42.3	118°14.7	22°12.9	278°02.3	-22°40.9	250°10.1	-21°31.3
Mer.pass.:10:54		v-0.4 d1.1 m-3.9		v0.7 d0.3 m1.5		v2.4 d-0.0 m-2.1		v2.4 d0.0 m0.6	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	196°57.0	209°28.0	-6°41.2	133°15.4	22°13.2	293°04.8	-22°40.9	265°12.4	-21°31.3
1	211°59.4	224°27.7	-6°40.1	148°16.1	22°13.5	308°07.2	-22°40.9	280°14.8	-21°31.3
2	227°01.9	239°27.3	-6°39.0	163°16.8	22°13.8	323°09.7	-22°40.9	295°17.2	-21°31.3
3	242°04.4	254°26.9	-6°37.9	178°17.5	22°14.1	338°12.1	-22°40.9	310°19.6	-21°31.3
4	257°06.8	269°26.6	-6°36.8	193°18.2	22°14.4	353°14.6	-22°40.9	325°21.9	-21°31.3
5	272°09.3	284°26.2	-6°35.7	208°18.9	22°14.7	8°17.0	-22°40.9	340°24.3	-21°31.3
6	287°11.8	299°25.8	-6°34.6	223°19.7	22°15.0	23°19.5	-22°40.9	355°26.7	-21°31.2
7	302°14.2	314°25.5	-6°33.5	238°20.4	22°15.3	38°21.9	-22°40.9	10°29.1	-21°31.2
8	317°16.7	329°25.1	-6°32.4	253°21.1	22°15.6	53°24.4	-22°40.9	25°31.4	-21°31.2
9	332°19.2	344°24.7	-6°31.3	268°21.8	22°15.9	68°26.8	-22°40.9	40°33.8	-21°31.2
10	347°21.6	359°24.4	-6°30.2	283°22.5	22°16.2	83°29.3	-22°40.9	55°36.2	-21°31.2
11	2°24.1	14°24.0	-6°29.1	298°23.2	22°16.5	98°31.7	-22°40.9	70°38.6	-21°31.2
12	17°26.5	29°23.6	-6°28.0	313°23.9	22°16.8	113°34.2	-22°40.9	85°40.9	-21°31.2
13	32°29.0	44°23.2	-6°26.9	328°24.7	22°17.1	128°36.6	-22°40.9	100°43.3	-21°31.2
14	47°31.5	59°22.9	-6°25.8	343°25.4	22°17.4	143°39.1	-22°40.9	115°45.7	-21°31.2
15	62°33.9	74°22.5	-6°24.7	358°26.1	22°17.7	158°41.5	-22°40.9	130°48.1	-21°31.1
16	77°36.4	89°22.2	-6°23.6	13°26.8	22°18.0	173°44.0	-22°40.9	145°50.4	-21°31.1
17	92°38.9	104°21.8	-6°22.5	28°27.5	22°18.3	188°46.5	-22°40.9	160°52.8	-21°31.1
18	107°41.3	119°21.4	-6°21.4	43°28.2	22°18.6	203°48.9	-22°40.9	175°55.2	-21°31.1
19	122°43.8	134°21.1	-6°20.3	58°28.9	22°18.9	218°51.4	-22°40.9	190°57.6	-21°31.1
20	137°46.3	149°20.7	-6°19.2	73°29.7	22°19.2	233°53.8	-22°40.9	205°59.9	-21°31.1
21	152°48.7	164°20.3	-6°18.1	88°30.4	22°19.5	248°56.3	-22°40.9	221°02.3	-21°31.1
22	167°51.2	179°20.0	-6°17.0	103°31.1	22°19.8	263°58.7	-22°40.9	236°04.7	-21°31.1
23	182°53.7	194°19.6	-6°15.9	118°31.8	22°20.1	279°01.2	-22°40.9	251°07.1	-21°31.1
Mer.pass.:10:50		v-0.4 d1.1 m-3.8		v0.7 d0.3 m1.5		v2.4 d-0.0 m-2.1		v2.4 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.3
Schedar	349°36.6	56°38.3
Diphda	348°52.2	-17°53.1
Achernar	335°24.4	-57°08.6
Hamal	327°56.7	23°33.0
Polaris	316°28.0	89°20.7
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°27.9	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.7
Betelgeuse	270°57.1	7°24.4
Canopus	263°54.5	-52°42.8
Sirius	258°30.2	-16°44.7
Adara	255°09.4	-29°00.3
Procyon	244°55.5	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.3	-59°34.6
Suhail	222°49.3	-43°30.9
Miaplacidus	221°38.4	-69°48.1
Alphard	217°52.0	-8°44.7
Regulus	207°39.1	11°52.3
Dubhe	193°46.3	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.3
Gacrux	171°55.9	-57°13.2
Alioth	166°16.7	55°51.4
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.7	-60°27.8
Menkent	148°02.6	-36°27.8
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.8	-60°54.6
Zubenelg.	137°00.8	-16°07.2
Kochab	137°19.0	74°04.6
Alphecca	126°07.4	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.2	-69°03.3
Sabik	102°07.9	-15°44.8
Shaula	96°16.4	-37°06.8
Rasalhague	96°02.7	12°32.7
Etamin	90°44.1	51°29.0
Kaus Aust.	83°38.5	-34°22.3
Vega	80°36.3	38°47.9
Nunki	75°53.4	-26°16.2
Altair	62°04.5	8°55.0
Peacock	53°13.2	-56°40.1
Deneb	49°29.0	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.1	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.9	28°11.0
Markab	13°34.7	15°18.3

2019/4/7	SHA	Mer.pass
Venus	14°47.3	10:01
Mars	297°42.2	15:09
Jupiter	96°08.9	04:35
Saturn	68°20.0	06:26

2019/4/8	SHA	Mer.pass
Venus	13°39.1	10:02
Mars	297°00.3	15:07
Jupiter	96°08.2	04:31
Saturn	68°17.7	06:22

2019/4/9	SHA	Mer.pass
Venus	12°31.1	10:02
Mars	296°18.4	15:06
Jupiter	96°07.8	04:27
Saturn	68°15.5	06:18

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°24.5	6°38.2	159°54.4	13.4	8°50.0	10.9	55.8
1	194°24.7	6°39.1	174°26.8	13.4	9°00.9	10.9	55.8
2	209°24.8	6°40.1	188°59.2	13.3	9°11.8	10.9	55.8
3	224°25.0	6°41.0	203°31.5	13.3	9°22.6	10.8	55.9
4	239°25.2	6°42.0	218°03.8	13.2	9°33.4	10.8	55.9
5	254°25.4	6°42.9	232°36.0	13.2	9°44.2	10.7	55.9
6	269°25.5	6°43.9	247°08.1	13.1	9°54.9	10.7	55.9
7	284°25.7	6°44.8	261°40.2	13.1	10°05.6	10.7	55.9
8	299°25.9	6°45.7	276°12.3	13.0	10°16.3	10.6	56.0
9	314°26.1	6°46.7	290°44.3	13.0	10°26.9	10.6	56.0
10	329°26.2	6°47.6	305°16.2	12.9	10°37.5	10.6	56.0
11	344°26.4	6°48.6	319°48.1	12.9	10°48.0	10.5	56.0
12	359°26.6	6°49.5	334°20.0	12.8	10°58.5	10.5	56.0
13	14°26.8	6°50.4	348°51.7	12.8	11°08.9	10.4	56.1
14	29°26.9	6°51.4	3°23.5	12.7	11°19.3	10.4	56.1
15	44°27.1	6°52.3	17°55.1	12.6	11°29.7	10.3	56.1
16	59°27.3	6°53.3	32°26.7	12.6	11°40.0	10.3	56.1
17	74°27.5	6°54.2	46°58.3	12.5	11°50.2	10.2	56.1
18	89°27.6	6°55.1	61°29.8	12.5	12°00.4	10.2	56.2
19	104°27.8	6°56.1	76°01.2	12.4	12°10.6	10.1	56.2
20	119°28.0	6°57.0	90°32.6	12.3	12°20.7	10.1	56.2
21	134°28.2	6°58.0	105°03.9	12.3	12°30.8	10.0	56.2
22	149°28.3	6°58.9	119°35.1	12.2	12°40.8	10.0	56.2
23	164°28.5	6°59.8	134°06.3	12.2	12°50.7	9.9	56.3
	SD.=16.0	d=0.9			S.D.=15.2		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°28.7	7°00.8	148°37.5	12.1	13°00.6	9.9	56.3
1	194°28.9	7°01.7	163°08.5	12.0	13°10.4	9.8	56.3
2	209°29.0	7°02.6	177°39.5	12.0	13°20.2	9.8	56.3
3	224°29.2	7°03.6	192°10.5	11.9	13°29.9	9.7	56.3
4	239°29.4	7°04.5	206°41.3	11.8	13°39.6	9.6	56.4
5	254°29.5	7°05.5	221°12.2	11.8	13°49.2	9.6	56.4
6	269°29.7	7°06.4	235°42.9	11.7	13°58.8	9.5	56.4
7	284°29.9	7°07.3	250°13.6	11.7	14°08.2	9.5	56.4
8	299°30.1	7°08.3	264°44.2	11.6	14°17.7	9.4	56.4
9	314°30.2	7°09.2	279°14.8	11.5	14°27.0	9.3	56.5
10	329°30.4	7°10.1	293°45.2	11.5	14°36.3	9.3	56.5
11	344°30.6	7°11.1	308°15.7	11.4	14°45.5	9.2	56.5
12	359°30.8	7°12.0	322°46.0	11.3	14°54.7	9.1	56.5
13	14°30.9	7°12.9	337°16.3	11.3	15°03.8	9.1	56.5
14	29°31.1	7°13.9	351°46.5	11.2	15°12.8	9.0	56.6
15	44°31.3	7°14.8	6°16.7	11.1	15°21.7	8.9	56.6
16	59°31.4	7°15.8	20°46.8	11.1	15°30.6	8.8	56.6
17	74°31.6	7°16.7	35°16.8	11.0	15°39.4	8.8	56.6
18	89°31.8	7°17.6	49°46.7	10.9	15°48.1	8.7	56.7
19	104°32.0	7°18.6	64°16.6	10.8	15°56.8	8.6	56.7
20	119°32.1	7°19.5	78°46.4	10.8	16°05.4	8.5	56.7
21	134°32.3	7°20.4	93°16.2	10.7	16°13.9	8.5	56.7
22	149°32.5	7°21.4	107°45.8	10.6	16°22.3	8.4	56.7
23	164°32.6	7°22.3	122°15.4	10.6	16°30.7	8.3	56.8
	SD.=16.0	d=0.9			S.D.=15.4		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°32.8	7°23.2	136°45.0	10.5	16°38.9	8.2	56.8
1	194°33.0	7°24.2	151°14.4	10.4	16°47.1	8.1	56.8
2	209°33.2	7°25.1	165°43.8	10.4	16°55.2	8.1	56.8
3	224°33.3	7°26.0	180°13.2	10.3	17°03.2	8.0	56.8
4	239°33.5	7°27.0	194°42.4	10.2	17°11.2	7.9	56.9
5	254°33.7	7°27.9	209°11.6	10.2	17°19.0	7.8	56.9
6	269°33.8	7°28.8	223°40.7	10.1	17°26.8	7.7	56.9
7	284°34.0	7°29.7	238°09.8	10.0	17°34.5	7.6	56.9
8	299°34.2	7°30.7	252°38.7	9.9	17°42.1	7.5	57.0
9	314°34.4	7°31.6	267°07.6	9.9	17°49.6	7.5	57.0
10	329°34.5	7°32.5	281°36.5	9.8	17°57.0	7.4	57.0
11	344°34.7	7°33.5	296°05.2	9.7	18°04.3	7.3	57.0
12	359°34.9	7°34.4	310°33.9	9.7	18°11.5	7.2	57.0
13	14°35.0	7°35.3	325°02.6	9.6	18°18.7	7.1	57.1
14	29°35.2	7°36.3	339°31.1	9.5	18°25.7	7.0	57.1
15	44°35.4	7°37.2	353°59.6	9.5	18°32.7	6.9	57.1
16	59°35.5	7°38.1	8°28.0	9.4	18°39.5	6.8	57.1
17	74°35.7	7°39.0	22°56.4	9.3	18°46.3	6.7	57.2
18	89°35.9	7°40.0	37°24.6	9.2	18°52.9	6.6	57.2
19	104°36.0	7°40.9	51°52.9	9.2	18°59.5	6.5	57.2
20	119°36.2	7°41.8	66°21.0	9.1	19°05.9	6.4	57.2
21	134°36.4	7°42.8	80°49.1	9.0	19°12.3	6.3	57.2
22	149°36.6	7°43.7	95°17.1	9.0	19°18.5	6.2	57.3
23	164°36.7	7°44.6	109°45.0	8.9	19°24.7	6.1	57.3
	SD.=16.0	d=0.9			S.D.=15.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:57	04:20	19:47	21:12	–:–
70	01:14	03:20	04:32	19:35	20:48	23:04
68	02:03	03:38	04:41	19:25	20:29	22:08
66	02:32	03:52	04:49	19:18	20:15	21:36
64	02:54	04:03	04:55	19:11	20:03	21:14
62	03:11	04:13	05:01	19:05	19:53	20:56
60	03:25	04:21	05:05	19:00	19:45	20:42
58	03:36	04:28	05:10	18:56	19:37	20:30
56	03:46	04:35	05:13	18:52	19:31	20:20
54	03:55	04:40	05:17	18:48	19:25	20:11
52	04:02	04:45	05:20	18:45	19:20	20:03
50	04:09	04:49	05:23	18:42	19:16	19:56
45	04:23	04:59	05:29	18:36	19:06	19:42
40	04:33	05:06	05:34	18:31	18:59	19:32
35	04:42	05:12	05:38	18:27	18:52	19:23
30	04:49	05:17	05:42	18:23	18:47	19:16
20	04:60	05:26	05:48	18:16	18:38	19:04
10	05:08	05:32	05:54	18:10	18:32	18:56
0	05:14	05:38	05:59	18:05	18:26	18:50
-10	05:18	05:43	06:04	18:00	18:21	18:46
-20	05:21	05:47	06:09	17:55	18:17	18:43
-30	05:23	05:51	06:15	17:49	18:13	18:41
-35	05:23	05:53	06:18	17:45	18:11	18:40
-40	05:23	05:54	06:22	17:42	18:09	18:40
-45	05:22	05:56	06:26	17:37	18:07	18:41
-50	05:21	05:59	06:31	17:32	18:04	18:42
-52	05:20	05:59	06:33	17:30	18:04	18:42
-54	05:19	06:00	06:36	17:27	18:03	18:43
-56	05:18	06:01	06:39	17:24	18:02	18:44
-58	05:17	06:02	06:42	17:21	18:00	18:46
-60	05:15	06:03	06:45	17:18	17:59	18:47

	Moonrise			Moonset		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	05:23	05:01	04:17	22:60	–:–	01:27
70	05:38	05:27	05:10	22:35	–:–	00:34
68	05:50	05:47	05:43	22:17	–:–	00:02
66	06:00	06:03	06:07	22:02	23:39	–:–
64	06:09	06:16	06:27	21:50	23:20	–:–
62	06:16	06:27	06:42	21:40	23:06	–:–
60	06:22	06:36	06:55	21:31	22:53	–:–
58	06:28	06:45	07:07	21:23	22:42	–:–
56	06:33	06:52	07:17	21:17	22:33	23:48
54	06:37	06:59	07:25	21:11	22:25	23:38
52	06:41	07:05	07:33	21:05	22:17	23:29
50	06:45	07:10	07:40	21:00	22:11	23:20
45	06:53	07:22	07:56	20:50	21:56	23:03
40	06:60	07:32	08:08	20:41	21:45	22:49
35	07:05	07:40	08:19	20:34	21:35	22:36
30	07:10	07:47	08:28	20:27	21:26	22:26
20	07:19	08:00	08:45	20:16	21:11	22:08
10	07:27	08:12	08:59	20:06	20:58	21:52
0	07:35	08:22	09:12	19:57	20:46	21:38
-10	07:42	08:33	09:26	19:48	20:34	21:23
-20	07:50	08:44	09:40	19:38	20:21	21:07
-30	07:60	08:58	09:57	19:27	20:06	20:49
-35	08:05	09:05	10:07	19:21	19:58	20:39
-40	08:11	09:14	10:18	19:14	19:48	20:27
-45	08:18	09:25	10:31	19:06	19:37	20:13
-50	08:27	09:37	10:47	18:55	19:23	19:56
-52	08:31	09:43	10:55	18:51	19:17	19:48
-54	08:35	09:49	11:04	18:46	19:10	19:39
-56	08:40	09:57	11:13	18:40	19:02	19:29
-58	08:46	10:05	11:24	18:34	18:53	19:18
-60	08:52	10:14	11:37	18:27	18:43	19:05

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	02:22	02:14	12:02	13:46	01:22	2(5%)
8	02:05	01:57	12:01	14:34	02:09	3(10%)
9	01:49	01:41	12:01	15:24	02:59	4(17%)

April 10, 11 ,12 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	197°56.1	209°19.2	-6°14.8	133°32.5	22°20.4	294°03.7	-22°40.9	266°09.5	-21°31.1
1	212°58.6	224°18.9	-6°13.7	148°33.2	22°20.7	309°06.1	-22°40.9	281°11.8	-21°31.0
2	228°01.0	239°18.5	-6°12.6	163°33.9	22°21.0	324°08.6	-22°40.9	296°14.2	-21°31.0
3	243°03.5	254°18.1	-6°11.5	178°34.6	22°21.3	339°11.0	-22°40.9	311°16.6	-21°31.0
4	258°06.0	269°17.8	-6°10.4	193°35.4	22°21.6	354°13.5	-22°40.9	326°19.0	-21°31.0
5	273°08.4	284°17.4	-6°09.3	208°36.1	22°21.9	9°15.9	-22°40.9	341°21.3	-21°31.0
6	288°10.9	299°17.0	-6°08.2	223°36.8	22°22.2	24°18.4	-22°40.9	356°23.7	-21°31.0
7	303°13.4	314°16.7	-6°07.1	238°37.5	22°22.5	39°20.9	-22°40.9	11°26.1	-21°31.0
8	318°15.8	329°16.3	-6°06.0	253°38.2	22°22.8	54°23.3	-22°40.9	26°28.5	-21°31.0
9	333°18.3	344°16.0	-6°04.9	268°38.9	22°23.1	69°25.8	-22°40.9	41°30.9	-21°31.0
10	348°20.8	359°15.6	-6°03.8	283°39.6	22°23.4	84°28.3	-22°40.9	56°33.2	-21°30.9
11	3°23.2	14°15.2	-6°02.6	298°40.3	22°23.7	99°30.7	-22°40.9	71°35.6	-21°30.9
12	18°25.7	29°14.9	-6°01.5	313°41.1	22°23.9	114°33.2	-22°40.9	86°38.0	-21°30.9
13	33°28.2	44°14.5	-6°00.4	328°41.8	22°24.2	129°35.6	-22°40.9	101°40.4	-21°30.9
14	48°30.6	59°14.1	-5°59.3	343°42.5	22°24.5	144°38.1	-22°40.9	116°42.8	-21°30.9
15	63°33.1	74°13.8	-5°58.2	358°43.2	22°24.8	159°40.6	-22°40.9	131°45.1	-21°30.9
16	78°35.5	89°13.4	-5°57.1	13°43.9	22°25.1	174°43.0	-22°40.9	146°47.5	-21°30.9
17	93°38.0	104°13.1	-5°56.0	28°44.6	22°25.4	189°45.5	-22°40.9	161°49.9	-21°30.9
18	108°40.5	119°12.7	-5°54.9	43°45.3	22°25.7	204°48.0	-22°40.9	176°52.3	-21°30.9
19	123°42.9	134°12.3	-5°53.8	58°46.0	22°26.0	219°50.4	-22°40.9	191°54.7	-21°30.9
20	138°45.4	149°12.0	-5°52.7	73°46.8	22°26.3	234°52.9	-22°40.9	206°57.0	-21°30.8
21	153°47.9	164°11.6	-5°51.6	88°47.5	22°26.6	249°55.3	-22°40.9	221°59.4	-21°30.8
22	168°50.3	179°11.3	-5°50.5	103°48.2	22°26.9	264°57.8	-22°40.9	237°01.8	-21°30.8
23	183°52.8	194°10.9	-5°49.4	118°48.9	22°27.2	280°00.3	-22°40.9	252°04.2	-21°30.8
Mer.pass.:10:46		v-0.4 d1.1 m-3.8		v0.7 d0.3 m1.5		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	198°55.3	209°10.5	-5°48.2	133°49.6	22°27.4	295°02.7	-22°40.9	267°06.6	-21°30.8
1	213°57.7	224°10.2	-5°47.1	148°50.3	22°27.7	310°05.2	-22°40.9	282°08.9	-21°30.8
2	229°00.2	239°09.8	-5°46.0	163°51.0	22°28.0	325°07.7	-22°40.9	297°11.3	-21°30.8
3	244°02.7	254°09.5	-5°44.9	178°51.7	22°28.3	340°10.1	-22°40.9	312°13.7	-21°30.8
4	259°05.1	269°09.1	-5°43.8	193°52.4	22°28.6	355°12.6	-22°40.9	327°16.1	-21°30.8
5	274°07.6	284°08.7	-5°42.7	208°53.1	22°28.9	10°15.1	-22°40.9	342°18.5	-21°30.8
6	289°10.0	299°08.4	-5°41.6	223°53.9	22°29.2	25°17.6	-22°40.9	357°20.9	-21°30.7
7	304°12.5	314°08.0	-5°40.5	238°54.6	22°29.5	40°20.0	-22°40.9	12°23.2	-21°30.7
8	319°15.0	329°07.7	-5°39.3	253°55.3	22°29.7	55°22.5	-22°40.9	27°25.6	-21°30.7
9	334°17.4	344°07.3	-5°38.2	268°56.0	22°30.0	70°25.0	-22°40.9	42°28.0	-21°30.7
10	349°19.9	359°06.9	-5°37.1	283°56.7	22°30.3	85°27.4	-22°40.9	57°30.4	-21°30.7
11	4°22.4	14°06.6	-5°36.0	298°57.4	22°30.6	100°29.9	-22°40.9	72°32.8	-21°30.7
12	19°24.8	29°06.2	-5°34.9	313°58.1	22°30.9	115°32.4	-22°40.9	87°35.2	-21°30.7
13	34°27.3	44°05.9	-5°33.8	328°58.8	22°31.2	130°34.8	-22°40.9	102°37.5	-21°30.7
14	49°29.8	59°05.5	-5°32.7	343°59.5	22°31.5	145°37.3	-22°40.9	117°39.9	-21°30.7
15	64°32.2	74°05.2	-5°31.6	359°00.3	22°31.8	160°39.8	-22°40.9	132°42.3	-21°30.7
16	79°34.7	89°04.8	-5°30.4	14°01.0	22°32.0	175°42.3	-22°40.9	147°44.7	-21°30.7
17	94°37.1	104°04.4	-5°29.3	29°01.7	22°32.3	190°44.7	-22°40.9	162°47.1	-21°30.6
18	109°39.6	119°04.1	-5°28.2	44°02.4	22°32.6	205°47.2	-22°40.9	177°49.5	-21°30.6
19	124°42.1	134°03.7	-5°27.1	59°03.1	22°32.9	220°49.7	-22°40.9	192°51.9	-21°30.6
20	139°44.5	149°03.4	-5°26.0	74°03.8	22°33.2	235°52.2	-22°40.9	207°54.2	-21°30.6
21	154°47.0	164°03.0	-5°24.9	89°04.5	22°33.5	250°54.6	-22°40.9	222°56.6	-21°30.6
22	169°49.5	179°02.7	-5°23.7	104°05.2	22°33.7	265°57.1	-22°40.9	237°59.0	-21°30.6
23	184°51.9	194°02.3	-5°22.6	119°05.9	22°34.0	280°59.6	-22°40.9	253°01.4	-21°30.6
Mer.pass.:10:42		v-0.4 d1.1 m-3.8		v0.7 d0.3 m1.5		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	199°54.4	209°02.0	-5°21.5	134°06.6	22°34.3	296°02.0	-22°40.9	268°03.8	-21°30.6
1	214°56.9	224°01.6	-5°20.4	149°07.3	22°34.6	311°04.5	-22°40.9	283°06.2	-21°30.6
2	229°59.3	239°01.2	-5°19.3	164°08.1	22°34.9	326°07.0	-22°40.9	298°08.6	-21°30.6
3	245°01.8	254°00.9	-5°18.2	179°08.8	22°35.1	341°09.5	-22°40.9	313°10.9	-21°30.5
4	260°04.3	269°00.5	-5°17.0	194°09.5	22°35.4	356°12.0	-22°40.9	328°13.3	-21°30.5
5	275°06.7	284°00.2	-5°15.9	209°10.2	22°35.7	11°14.4	-22°40.9	343°15.7	-21°30.5
6	290°09.2	298°59.8	-5°14.8	224°10.9	22°36.0	26°16.9	-22°40.9	358°18.1	-21°30.5
7	305°11.6	313°59.5	-5°13.7	239°11.6	22°36.3	41°19.4	-22°40.9	13°20.5	-21°30.5
8	320°14.1	328°59.1	-5°12.6	254°12.3	22°36.5	56°21.9	-22°40.9	28°22.9	-21°30.5
9	335°16.6	343°58.8	-5°11.4	269°13.0	22°36.8	71°24.3	-22°40.9	43°25.3	-21°30.5
10	350°19.0	358°58.4	-5°10.3	284°13.7	22°37.1	86°26.8	-22°40.9	58°27.6	-21°30.5
11	5°21.5	13°58.1	-5°09.2	299°14.4	22°37.4	101°29.3	-22°40.9	73°30.0	-21°30.5
12	20°24.0	28°57.7	-5°08.1	314°15.1	22°37.7	116°31.8	-22°40.9	88°32.4	-21°30.5
13	35°26.4	43°57.4	-5°07.0	329°15.9	22°37.9	131°34.3	-22°40.9	103°34.8	-21°30.5
14	50°28.9	58°57.0	-5°05.8	344°16.6	22°38.2	146°36.7	-22°40.9	118°37.2	-21°30.4
15	65°31.4	73°56.6	-5°04.7	359°17.3	22°38.5	161°39.2	-22°40.9	133°39.6	-21°30.4
16	80°33.8	88°56.3	-5°03.6	14°18.0	22°38.8	176°41.7	-22°40.9	148°42.0	-21°30.4
17	95°36.3	103°55.9	-5°02.5	29°18.7	22°39.0	191°44.2	-22°40.9	163°44.4	-21°30.4
18	110°38.8	118°55.6	-5°01.4	44°19.4	22°39.3	206°46.7	-22°40.9	178°46.8	-21°30.4
19	125°41.2	133°55.2	-5°00.2	59°20.1	22°39.6	221°49.1	-22°40.9	193°49.1	-21°30.4
20	140°43.7	148°54.9	-4°59.1	74°20.8	22°39.9	236°51.6	-22°40.9	208°51.5	-21°30.4
21	155°46.1	163°54.5	-4°58.0	89°21.5	22°40.1	251°54.1	-22°40.9	223°53.9	-21°30.4
22	170°48.6	178°54.2	-4°56.9	104°22.2	22°40.4	266°56.6	-22°40.9	238°56.3	-21°30.4
23	185°51.1	193°53.8	-4°55.7	119°22.9	22°40.7	281°59.1	-22°40.9	253°58.7	-21°30.4
Mer.pass.:10:38		v-0.4 d1.1 m-3.8		v0.7 d0.3 m1.5		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.2
Schedar	349°36.6	56°38.3
Diphda	348°52.1	-17°53.1
Achernar	335°24.4	-57°08.6
Hamal	327°56.7	23°33.0
Polaris	316°28.4	89°20.7
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°27.9	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.7
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.5	-52°42.8
Sirius	258°30.2	-16°44.7
Adara	255°09.5	-29°00.3
Procyon	244°55.5	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.3	-59°34.6
Suhail	222°49.4	-43°30.9
Miaplacidus	221°38.5	-69°48.1
Alphard	217°52.0	-8°44.7
Regulus	207°39.1	11°52.3
Dubhe	193°46.3	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.3
Gacrux	171°55.9	-57°13.3
Alioth	166°16.7	55°51.4
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.6	-60°27.8
Menkent	148°02.5	-36°27.8
Arcturus	145°51.7	19°05.2
Rigil Kent.	139°45.8	-60°54.7
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.0	74°04.6
Alphecca	126°07.4	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.1	-69°03.3
Sabik	102°07.8	-15°44.8
Shaula	96°16.4	-37°06.8
Rasalhague	96°02.7	12°32.7
Etamin	90°44.1	51°29.0
Kaus Aust.	83°38.5	-34°22.3
Vega	80°36.2	38°47.9
Nunki	75°53.4	-26°16.2
Altair	62°04.5	8°55.0
Peacock	53°13.2	-56°40.1
Deneb	49°29.0	45°20.7
Enif	33°43.5	9°57.6
Alnair	27°39.1	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.9	28°10.9
Markab	13°34.7	15°18.3

2019/4/1	**SHA**	**Mer.pass**
Venus	11°23.1	10:03
Mars	295°36.4	15:05
Jupiter	96°07.5	04:23
Saturn	68°13.3	06:14

2019/4/1	**SHA**	**Mer.pass**
Venus	10°15.3	10:04
Mars	294°54.3	15:04
Jupiter	96°07.5	04:19
Saturn	68°11.3	06:11

2019/4/1	**SHA**	**Mer.pass**
Venus	9°07.6	10:04
Mars	294°12.2	15:03
Jupiter	96°07.7	04:15
Saturn	68°09.4	06:07

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°36.9	7°45.5	124°12.9	8.8	19°30.7	6.0	57.3
1	194°37.1	7°46.5	138°40.7	8.8	19°36.6	5.9	57.3
2	209°37.2	7°47.4	153°08.4	8.7	19°42.5	5.8	57.4
3	224°37.4	7°48.3	167°36.1	8.6	19°48.2	5.7	57.4
4	239°37.6	7°49.3	182°03.7	8.6	19°53.8	5.6	57.4
5	254°37.7	7°50.2	196°31.2	8.5	19°59.3	5.5	57.4
6	269°37.9	7°51.1	210°58.7	8.4	20°04.7	5.3	57.4
7	284°38.1	7°52.0	225°26.1	8.4	20°10.0	5.2	57.5
8	299°38.2	7°53.0	239°53.4	8.3	20°15.2	5.1	57.5
9	314°38.4	7°53.9	254°20.7	8.2	20°20.2	5.0	57.5
10	329°38.6	7°54.8	268°47.9	8.2	20°25.2	4.9	57.5
11	344°38.7	7°55.7	283°15.1	8.1	20°30.0	4.8	57.6
12	359°38.9	7°56.7	297°42.2	8.1	20°34.7	4.7	57.6
13	14°39.1	7°57.6	312°09.2	8.0	20°39.3	4.5	57.6
14	29°39.2	7°58.5	326°36.2	7.9	20°43.8	4.4	57.6
15	44°39.4	7°59.4	341°03.1	7.9	20°48.2	4.3	57.7
16	59°39.6	8°00.4	355°29.9	7.8	20°52.4	4.2	57.7
17	74°39.7	8°01.3	9°56.7	7.8	20°56.5	4.1	57.7
18	89°39.9	8°02.2	24°23.4	7.7	21°00.6	3.9	57.7
19	104°40.1	8°03.1	38°50.1	7.6	21°04.4	3.8	57.7
20	119°40.2	8°04.0	53°16.7	7.6	21°08.2	3.7	57.8
21	134°40.4	8°05.0	67°43.3	7.5	21°11.8	3.6	57.8
22	149°40.6	8°05.9	82°09.8	7.5	21°15.4	3.5	57.8
23	164°40.7	8°06.8	96°36.2	7.4	21°18.7	3.3	57.8
	SD.=16.0	d=0.9			S.D.=15.6		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°40.9	8°07.7	111°02.6	7.4	21°22.0	3.2	57.9
1	194°41.1	8°08.7	125°29.0	7.3	21°25.1	3.1	57.9
2	209°41.2	8°09.6	139°55.3	7.3	21°28.2	2.9	57.9
3	224°41.4	8°10.5	154°21.5	7.2	21°31.0	2.8	57.9
4	239°41.6	8°11.4	168°47.7	7.2	21°33.8	2.7	58.0
5	254°41.7	8°12.3	183°13.8	7.1	21°36.4	2.6	58.0
6	269°41.9	8°13.3	197°39.9	7.1	21°38.9	2.4	58.0
7	284°42.1	8°14.2	212°06.0	7.0	21°41.3	2.3	58.0
8	299°42.2	8°15.1	226°32.0	7.0	21°43.5	2.2	58.0
9	314°42.4	8°16.0	240°57.9	6.9	21°45.6	2.0	58.1
10	329°42.6	8°16.9	255°23.8	6.9	21°47.6	1.9	58.1
11	344°42.7	8°17.9	269°49.7	6.8	21°49.4	1.8	58.1
12	359°42.9	8°18.8	284°15.5	6.8	21°51.2	1.6	58.1
13	14°43.1	8°19.7	298°41.3	6.8	21°52.7	1.5	58.2
14	29°43.2	8°20.6	313°07.0	6.7	21°54.2	1.4	58.2
15	44°43.4	8°21.5	327°32.7	6.7	21°55.5	1.2	58.2
16	59°43.6	8°22.5	341°58.4	6.6	21°56.6	1.1	58.2
17	74°43.7	8°23.4	356°24.0	6.6	21°57.7	1.0	58.3
18	89°43.9	8°24.3	10°49.6	6.6	21°58.6	0.8	58.3
19	104°44.0	8°25.2	25°15.1	6.5	21°59.3	0.7	58.3
20	119°44.2	8°26.1	39°40.7	6.5	21°60.0	0.6	58.3
21	134°44.4	8°27.0	54°06.1	6.5	22°00.4	0.4	58.3
22	149°44.5	8°28.0	68°31.6	6.4	22°00.8	0.3	58.4
23	164°44.7	8°28.9	82°57.0	6.4	22°01.0	0.1	58.4
	SD.=16.0	d=0.9			S.D.=15.8		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°44.9	8°29.8	97°22.4	6.4	22°01.1	0.0	58.4
1	194°45.0	8°30.7	111°47.8	6.4	22°01.0	-0.1	58.4
2	209°45.2	8°31.6	126°13.1	6.3	22°00.8	-0.3	58.5
3	224°45.4	8°32.5	140°38.4	6.3	22°00.5	-0.4	58.5
4	239°45.5	8°33.5	155°03.7	6.3	21°60.0	-0.6	58.5
5	254°45.7	8°34.4	169°29.0	6.3	21°59.3	-0.7	58.5
6	269°45.8	8°35.3	183°54.2	6.2	21°58.6	-0.8	58.5
7	284°46.0	8°36.2	198°19.4	6.2	21°57.7	-1.0	58.6
8	299°46.2	8°37.1	212°44.6	6.2	21°56.6	-1.1	58.6
9	314°46.3	8°38.0	227°09.8	6.2	21°55.4	-1.3	58.6
10	329°46.5	8°38.9	241°35.0	6.2	21°54.1	-1.4	58.6
11	344°46.7	8°39.9	256°00.2	6.1	21°52.6	-1.5	58.7
12	359°46.8	8°40.8	270°25.3	6.1	21°51.0	-1.7	58.7
13	14°47.0	8°41.7	284°50.4	6.1	21°49.3	-1.8	58.7
14	29°47.1	8°42.6	299°15.5	6.1	21°47.4	-2.0	58.7
15	44°47.3	8°43.5	313°40.6	6.1	21°45.3	-2.1	58.8
16	59°47.5	8°44.4	328°05.7	6.1	21°43.2	-2.2	58.8
17	74°47.6	8°45.3	342°30.8	6.1	21°40.8	-2.4	58.8
18	89°47.8	8°46.2	356°55.9	6.1	21°38.4	-2.5	58.8
19	104°47.9	8°47.2	11°20.9	6.1	21°35.8	-2.7	58.8
20	119°48.1	8°48.1	25°46.0	6.1	21°33.0	-2.8	58.9
21	134°48.3	8°49.0	40°11.0	6.1	21°30.2	-3.0	58.9
22	149°48.4	8°49.9	54°36.1	6.1	21°27.1	-3.1	58.9
23	164°48.6	8°50.8	69°01.2	6.1	21°24.0	-3.2	58.9
	SD.=16.0	d=0.9			S.D.=15.9		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:35	04:04	20:02	21:33	–:–
70	–:–	03:02	04:17	19:48	21:04	–:–
68	01:36	03:23	04:28	19:37	20:43	22:35
66	02:13	03:39	04:37	19:28	20:27	21:54
64	02:39	03:52	04:44	19:20	20:13	21:28
62	02:58	04:02	04:51	19:13	20:02	21:08
60	03:13	04:12	04:56	19:07	19:53	20:52
58	03:26	04:19	05:01	19:02	19:45	20:38
56	03:37	04:26	05:06	18:58	19:38	20:27
54	03:46	04:32	05:10	18:54	19:31	20:18
52	03:54	04:38	05:13	18:50	19:26	20:09
50	04:02	04:43	05:16	18:47	19:21	20:02
45	04:17	04:53	05:23	18:40	19:10	19:47
40	04:28	05:01	05:29	18:34	19:02	19:35
35	04:37	05:08	05:34	18:29	18:55	19:26
30	04:45	05:14	05:38	18:25	18:49	19:18
20	04:57	05:23	05:46	18:17	18:39	19:06
10	05:06	05:31	05:52	18:10	18:32	18:56
0	05:13	05:37	05:58	18:04	18:25	18:50
-10	05:18	05:42	06:04	17:59	18:20	18:44
-20	05:22	05:47	06:10	17:52	18:15	18:40
-30	05:25	05:52	06:16	17:45	18:09	18:37
-35	05:25	05:55	06:20	17:41	18:07	18:36
-40	05:26	05:57	06:25	17:37	18:04	18:36
-45	05:26	06:00	06:30	17:32	18:01	18:35
-50	05:26	06:03	06:36	17:26	17:58	18:36
-52	05:25	06:04	06:38	17:23	17:57	18:36
-54	05:25	06:06	06:41	17:20	17:56	18:36
-56	05:24	06:07	06:45	17:17	17:54	18:37
-58	05:23	06:09	06:48	17:13	17:53	18:38
-60	05:22	06:10	06:52	17:09	17:51	18:39

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	–:–	–:–	–:–	–:–
70	04:26	–:–	–:–	03:08	–:–	–:–
68	05:40	05:40	06:15	01:54	03:49	05:14
66	06:18	06:41	07:32	01:17	02:48	03:57
64	06:44	07:16	08:09	00:51	02:14	03:20
62	07:05	07:41	08:35	00:30	01:49	02:53
60	07:22	08:01	08:56	00:14	01:29	02:32
58	07:36	08:17	09:13	00:00	01:13	02:15
56	07:49	08:31	09:27	–:–	00:59	02:01
54	07:59	08:43	09:40	–:–	00:47	01:49
52	08:09	08:54	09:51	–:–	00:37	01:38
50	08:18	09:04	10:00	–:–	00:27	01:28
45	08:36	09:24	10:21	–:–	00:07	01:08
40	08:51	09:40	10:37	23:51	–:–	00:51
35	09:03	09:54	10:51	23:38	–:–	00:37
30	09:14	10:06	11:03	23:26	–:–	00:25
20	09:33	10:27	11:24	23:06	–:–	00:04
10	09:50	10:45	11:42	22:48	23:46	–:–
0	10:06	11:01	11:59	22:32	23:29	–:–
-10	10:21	11:18	12:16	22:16	23:12	–:–
-20	10:38	11:36	12:34	21:58	22:53	23:53
-30	10:57	11:57	12:55	21:38	22:32	23:32
-35	11:09	12:09	13:07	21:26	22:20	23:20
-40	11:22	12:23	13:21	21:13	22:06	23:07
-45	11:37	12:40	13:37	20:57	21:49	22:50
-50	11:56	13:01	13:58	20:37	21:28	22:30
-52	12:05	13:11	14:07	20:28	21:19	22:21
-54	12:15	13:22	14:18	20:18	21:07	22:10
-56	12:27	13:34	14:31	20:06	20:55	21:58
-58	12:40	13:49	14:45	19:52	20:40	21:43
-60	12:56	14:06	15:02	19:37	20:23	21:27

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	01:32	01:24	12:01	16:18	03:51	5(26%)
11	01:16	01:08	12:01	17:14	04:46	6(36%)
12	01:01	00:53	12:00	18:12	05:43	7(47%)

April 13, 14 ,15 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	200°53.5	208°53.5	-4°54.6	134°23.6	22°41.0	297°01.6	-22°40.9	269°01.1	-21°30.4
1	215°56.0	223°53.1	-4°53.5	149°24.3	22°41.2	312°04.0	-22°40.9	284°03.5	-21°30.4
2	230°58.5	238°52.8	-4°52.4	164°25.1	22°41.5	327°06.5	-22°40.9	299°05.9	-21°30.3
3	246°00.9	253°52.4	-4°51.2	179°25.8	22°41.8	342°09.0	-22°40.9	314°08.3	-21°30.3
4	261°03.4	268°52.1	-4°50.1	194°26.5	22°42.1	357°11.5	-22°40.9	329°10.7	-21°30.3
5	276°05.9	283°51.7	-4°49.0	209°27.2	22°42.3	12°14.0	-22°40.9	344°13.1	-21°30.3
6	291°08.3	298°51.4	-4°47.9	224°27.9	22°42.6	27°16.5	-22°40.9	359°15.4	-21°30.3
7	306°10.8	313°51.0	-4°46.7	239°28.6	22°42.9	42°18.9	-22°40.9	14°17.8	-21°30.3
8	321°13.3	328°50.7	-4°45.6	254°29.3	22°43.2	57°21.4	-22°40.9	29°20.2	-21°30.3
9	336°15.7	343°50.3	-4°44.5	269°30.0	22°43.4	72°23.9	-22°40.9	44°22.6	-21°30.3
10	351°18.2	358°50.0	-4°43.4	284°30.7	22°43.7	87°26.4	-22°40.9	59°25.0	-21°30.3
11	6°20.6	13°49.6	-4°42.2	299°31.4	22°44.0	102°28.9	-22°40.9	74°27.4	-21°30.3
12	21°23.1	28°49.3	-4°41.1	314°32.1	22°44.2	117°31.4	-22°40.9	89°29.8	-21°30.3
13	36°25.6	43°48.9	-4°40.0	329°32.8	22°44.5	132°33.9	-22°40.9	104°32.2	-21°30.3
14	51°28.0	58°48.6	-4°38.9	344°33.5	22°44.8	147°36.4	-22°40.9	119°34.6	-21°30.2
15	66°30.5	73°48.2	-4°37.7	359°34.2	22°45.0	162°38.8	-22°40.9	134°37.0	-21°30.2
16	81°33.0	88°47.9	-4°36.6	14°34.9	22°45.3	177°41.3	-22°40.9	149°39.4	-21°30.2
17	96°35.4	103°47.5	-4°35.5	29°35.7	22°45.6	192°43.8	-22°40.9	164°41.8	-21°30.2
18	111°37.9	118°47.2	-4°34.3	44°36.4	22°45.9	207°46.3	-22°40.9	179°44.2	-21°30.2
19	126°40.4	133°46.8	-4°33.2	59°37.1	22°46.1	222°48.8	-22°40.9	194°46.5	-21°30.2
20	141°42.8	148°46.5	-4°32.1	74°37.8	22°46.4	237°51.3	-22°40.8	209°48.9	-21°30.2
21	156°45.3	163°46.1	-4°31.0	89°38.5	22°46.7	252°53.8	-22°40.8	224°51.3	-21°30.2
22	171°47.7	178°45.8	-4°29.8	104°39.2	22°46.9	267°56.3	-22°40.8	239°53.7	-21°30.2
23	186°50.2	193°45.4	-4°28.7	119°39.9	22°47.2	282°58.8	-22°40.8	254°56.1	-21°30.2
Mer.pass.:10:34		v-0.4 d1.1 m-3.8		v0.7 d0.3 m1.5		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	201°52.7	208°45.1	-4°27.6	134°40.6	22°47.5	298°01.3	-22°40.8	269°58.5	-21°30.2
1	216°55.1	223°44.8	-4°26.4	149°41.3	22°47.7	313°03.8	-22°40.8	285°00.9	-21°30.2
2	231°57.6	238°44.4	-4°25.3	164°42.0	22°48.0	328°06.2	-22°40.8	300°03.3	-21°30.1
3	247°00.1	253°44.1	-4°24.2	179°42.7	22°48.3	343°08.7	-22°40.8	315°05.7	-21°30.1
4	262°02.5	268°43.7	-4°23.0	194°43.4	22°48.5	358°11.2	-22°40.8	330°08.1	-21°30.1
5	277°05.0	283°43.4	-4°21.9	209°44.1	22°48.8	13°13.7	-22°40.8	345°10.5	-21°30.1
6	292°07.5	298°43.0	-4°20.8	224°44.8	22°49.1	28°16.2	-22°40.8	0°12.9	-21°30.1
7	307°09.9	313°42.7	-4°19.7	239°45.5	22°49.3	43°18.7	-22°40.8	15°15.3	-21°30.1
8	322°12.4	328°42.3	-4°18.5	254°46.2	22°49.6	58°21.2	-22°40.8	30°17.7	-21°30.1
9	337°14.9	343°42.0	-4°17.4	269°46.9	22°49.8	73°23.7	-22°40.8	45°20.1	-21°30.1
10	352°17.3	358°41.6	-4°16.3	284°47.6	22°50.1	88°26.2	-22°40.8	60°22.5	-21°30.1
11	7°19.8	13°41.3	-4°15.1	299°48.4	22°50.4	103°28.7	-22°40.8	75°24.9	-21°30.1
12	22°22.2	28°40.9	-4°14.0	314°49.1	22°50.6	118°31.2	-22°40.8	90°27.3	-21°30.1
13	37°24.7	43°40.6	-4°12.9	329°49.8	22°50.9	133°33.7	-22°40.8	105°29.7	-21°30.1
14	52°27.2	58°40.3	-4°11.7	344°50.5	22°51.2	148°36.2	-22°40.8	120°32.1	-21°30.0
15	67°29.6	73°39.9	-4°10.6	359°51.2	22°51.4	163°38.7	-22°40.8	135°34.5	-21°30.0
16	82°32.1	88°39.6	-4°09.5	14°51.9	22°51.7	178°41.2	-22°40.8	150°36.9	-21°30.0
17	97°34.6	103°39.2	-4°08.3	29°52.6	22°51.9	193°43.7	-22°40.8	165°39.2	-21°30.0
18	112°37.0	118°38.9	-4°07.2	44°53.3	22°52.2	208°46.2	-22°40.8	180°41.6	-21°30.0
19	127°39.5	133°38.5	-4°06.1	59°54.0	22°52.5	223°48.7	-22°40.8	195°44.0	-21°30.0
20	142°42.0	148°38.2	-4°04.9	74°54.7	22°52.7	238°51.2	-22°40.8	210°46.4	-21°30.0
21	157°44.4	163°37.8	-4°03.8	89°55.4	22°53.0	253°53.7	-22°40.8	225°48.8	-21°30.0
22	172°46.9	178°37.5	-4°02.7	104°56.1	22°53.2	268°56.2	-22°40.8	240°51.2	-21°30.0
23	187°49.4	193°37.2	-4°01.5	119°56.8	22°53.5	283°58.7	-22°40.8	255°53.6	-21°30.0
Mer.pass.:10:30		v-0.3 d1.1 m-3.8		v0.7 d0.3 m1.5		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	202°51.8	208°36.8	-4°00.4	134°57.5	22°53.8	299°01.2	-22°40.8	270°56.0	-21°30.0
1	217°54.3	223°36.5	-3°59.2	149°58.2	22°54.0	314°03.7	-22°40.8	285°58.4	-21°30.0
2	232°56.7	238°36.1	-3°58.1	164°58.9	22°54.3	329°06.2	-22°40.8	301°00.8	-21°30.0
3	247°59.2	253°35.8	-3°57.0	179°59.6	22°54.5	344°08.7	-22°40.8	316°03.2	-21°30.0
4	263°01.7	268°35.4	-3°55.8	195°00.3	22°54.8	359°11.2	-22°40.8	331°05.6	-21°29.9
5	278°04.1	283°35.1	-3°54.7	210°01.0	22°55.0	14°13.7	-22°40.8	346°08.0	-21°29.9
6	293°06.6	298°34.7	-3°53.6	225°01.7	22°55.3	29°16.2	-22°40.8	1°10.4	-21°29.9
7	308°09.1	313°34.4	-3°52.4	240°02.4	22°55.6	44°18.7	-22°40.8	16°12.8	-21°29.9
8	323°11.5	328°34.1	-3°51.3	255°03.1	22°55.8	59°21.2	-22°40.8	31°15.2	-21°29.9
9	338°14.0	343°33.7	-3°50.1	270°03.8	22°56.1	74°23.7	-22°40.8	46°17.6	-21°29.9
10	353°16.5	358°33.4	-3°49.0	285°04.6	22°56.3	89°26.2	-22°40.8	61°20.0	-21°29.9
11	8°18.9	13°33.0	-3°47.9	300°05.3	22°56.6	104°28.7	-22°40.8	76°22.4	-21°29.9
12	23°21.4	28°32.7	-3°46.7	315°06.0	22°56.8	119°31.2	-22°40.8	91°24.8	-21°29.9
13	38°23.8	43°32.3	-3°45.6	330°06.7	22°57.1	134°33.7	-22°40.8	106°27.2	-21°29.9
14	53°26.3	58°32.0	-3°44.5	345°07.4	22°57.3	149°36.2	-22°40.8	121°29.6	-21°29.9
15	68°28.8	73°31.7	-3°43.3	0°08.1	22°57.6	164°38.7	-22°40.8	136°32.0	-21°29.9
16	83°31.2	88°31.3	-3°42.2	15°08.8	22°57.9	179°41.2	-22°40.8	151°34.4	-21°29.9
17	98°33.7	103°31.0	-3°41.0	30°09.5	22°58.1	194°43.7	-22°40.8	166°36.8	-21°29.8
18	113°36.2	118°30.6	-3°39.9	45°10.2	22°58.4	209°46.2	-22°40.8	181°39.2	-21°29.8
19	128°38.6	133°30.3	-3°38.8	60°10.9	22°58.6	224°48.7	-22°40.8	196°41.6	-21°29.8
20	143°41.1	148°30.0	-3°37.6	75°11.6	22°58.9	239°51.2	-22°40.8	211°44.0	-21°29.8
21	158°43.6	163°29.6	-3°36.5	90°12.3	22°59.1	254°53.8	-22°40.8	226°46.5	-21°29.8
22	173°46.0	178°29.3	-3°35.3	105°13.0	22°59.4	269°56.3	-22°40.8	241°48.9	-21°29.8
23	188°48.5	193°28.9	-3°34.2	120°13.7	22°59.6	284°58.8	-22°40.8	256°51.3	-21°29.8
Mer.pass.:10:26		v-0.3 d1.1 m-3.8		v0.7 d0.3 m1.5		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°39.8	29°11.6
Ankaa	353°12.2	-42°12.2
Schedar	349°36.6	56°38.3
Diphda	348°52.1	-17°53.1
Achernar	335°24.4	-57°08.5
Hamal	327°56.7	23°33.0
Polaris	316°28.9	89°20.7
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°27.9	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.7
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.6	-52°42.8
Sirius	258°30.2	-16°44.7
Adara	255°09.5	-29°00.3
Procyon	244°55.5	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.3	-59°34.6
Suhail	222°49.4	-43°30.9
Miaplacidus	221°38.5	-69°48.1
Alphard	217°52.0	-8°44.7
Regulus	207°39.1	11°52.3
Dubhe	193°46.3	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.4
Gacrux	171°55.9	-57°13.3
Alioth	166°16.7	55°51.4
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.6	-60°27.8
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.2
Rigil Kent.	139°45.7	-60°54.7
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.0	74°04.6
Alphecca	126°07.4	26°39.0
Antares	112°21.1	-26°28.3
Atria	107°19.1	-69°03.4
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.8
Rasalhague	96°02.6	12°32.8
Etamin	90°44.1	51°29.0
Kaus Aust.	83°38.4	-34°22.3
Vega	80°36.2	38°47.9
Nunki	75°53.4	-26°16.2
Altair	62°04.5	8°55.0
Peacock	53°13.1	-56°40.1
Deneb	49°28.9	45°20.7
Enif	33°43.4	9°57.6
Alnair	27°39.1	-46°52.0
Fomalhaut	15°20.0	-29°31.3
Scheat	13°49.9	28°10.9
Markab	13°34.7	15°18.3

2019/4/1	SHA	Mer.pass
Venus	7°59.9	10:05
Mars	293°30.1	15:02
Jupiter	96°08.0	04:11
Saturn	68°07.6	06:03

2019/4/1	SHA	Mer.pass
Venus	6°52.4	10:05
Mars	292°47.9	15:01
Jupiter	96°08.6	04:07
Saturn	68°05.8	05:59

2019/4/1	SHA	Mer.pass
Venus	5°45.0	10:06
Mars	292°05.7	14:59
Jupiter	96°09.4	04:03
Saturn	68°04.2	05:55

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°48.7	8°51.7	83°26.2	6.1	21°20.7	-3.4	58.9
1	194°48.9	8°52.6	97°51.3	6.1	21°17.2	-3.5	59.0
2	209°49.1	8°53.5	112°16.3	6.1	21°13.6	-3.7	59.0
3	224°49.2	8°54.4	126°41.4	6.1	21°09.9	-3.8	59.0
4	239°49.4	8°55.3	141°06.4	6.1	21°06.0	-3.9	59.0
5	254°49.5	8°56.2	155°31.5	6.1	21°02.0	-4.1	59.1
6	269°49.7	8°57.2	169°56.6	6.1	20°57.9	-4.2	59.1
7	284°49.9	8°58.1	184°21.7	6.1	20°53.6	-4.4	59.1
8	299°50.0	8°59.0	198°46.8	6.1	20°49.2	-4.5	59.1
9	314°50.2	8°59.9	213°11.9	6.1	20°44.6	-4.6	59.1
10	329°50.3	9°00.8	227°37.0	6.1	20°39.9	-4.8	59.2
11	344°50.5	9°01.7	242°02.1	6.1	20°35.1	-4.9	59.2
12	359°50.7	9°02.6	256°27.2	6.1	20°30.1	-5.0	59.2
13	14°50.8	9°03.5	270°52.4	6.2	20°25.0	-5.2	59.2
14	29°51.0	9°04.4	285°17.6	6.2	20°19.7	-5.3	59.2
15	44°51.1	9°05.3	299°42.7	6.2	20°14.4	-5.5	59.3
16	59°51.3	9°06.2	314°07.9	6.2	20°08.8	-5.6	59.3
17	74°51.5	9°07.1	328°33.2	6.2	20°03.2	-5.7	59.3
18	89°51.6	9°08.0	342°58.4	6.2	19°57.4	-5.9	59.3
19	104°51.8	9°08.9	357°23.6	6.3	19°51.5	-6.0	59.3
20	119°51.9	9°09.8	11°48.9	6.3	19°45.4	-6.1	59.4
21	134°52.1	9°10.8	26°14.2	6.3	19°39.2	-6.3	59.4
22	149°52.2	9°11.7	40°39.5	6.3	19°32.9	-6.4	59.4
23	164°52.4	9°12.6	55°04.9	6.4	19°26.5	-6.5	59.4
	SD.=16.0	d=0.9			S.D.=16.1		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°52.6	9°13.5	69°30.3	6.4	19°19.9	-6.6	59.4
1	194°52.7	9°14.4	83°55.7	6.4	19°13.2	-6.8	59.5
2	209°52.9	9°15.3	98°21.1	6.4	19°06.4	-6.9	59.5
3	224°53.0	9°16.2	112°46.5	6.5	18°59.4	-7.0	59.5
4	239°53.2	9°17.1	127°12.0	6.5	18°52.3	-7.2	59.5
5	254°53.3	9°18.0	141°37.5	6.5	18°45.1	-7.3	59.5
6	269°53.5	9°18.9	156°03.0	6.5	18°37.7	-7.4	59.6
7	284°53.7	9°19.8	170°28.6	6.6	18°30.3	-7.5	59.6
8	299°53.8	9°20.7	184°54.2	6.6	18°22.7	-7.7	59.6
9	314°54.0	9°21.6	199°19.8	6.6	18°15.0	-7.8	59.6
10	329°54.1	9°22.5	213°45.5	6.7	18°07.1	-7.9	59.6
11	344°54.3	9°23.4	228°11.2	6.7	17°59.2	-8.0	59.6
12	359°54.4	9°24.3	242°36.9	6.7	17°51.1	-8.1	59.7
13	14°54.6	9°25.2	257°02.6	6.8	17°42.9	-8.3	59.7
14	29°54.7	9°26.1	271°28.4	6.8	17°34.6	-8.4	59.7
15	44°54.9	9°27.0	285°54.2	6.8	17°26.1	-8.5	59.7
16	59°55.1	9°27.9	300°20.1	6.9	17°17.6	-8.6	59.7
17	74°55.2	9°28.8	314°46.0	6.9	17°08.9	-8.7	59.7
18	89°55.4	9°29.7	329°11.9	6.9	17°00.1	-8.8	59.8
19	104°55.5	9°30.6	343°37.9	7.0	16°51.2	-9.0	59.8
20	119°55.7	9°31.5	358°03.9	7.0	16°42.2	-9.1	59.8
21	134°55.8	9°32.4	12°29.9	7.1	16°33.1	-9.2	59.8
22	149°56.0	9°33.3	26°56.0	7.1	16°23.8	-9.3	59.8
23	164°56.1	9°34.2	41°22.1	7.1	16°14.5	-9.4	59.8
	SD.=15.9	d=0.9			S.D.=16.2		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°56.3	9°35.1	55°48.2	7.2	16°05.0	-9.5	59.8
1	194°56.4	9°36.0	70°14.4	7.2	15°55.5	-9.6	59.9
2	209°56.6	9°36.9	84°40.7	7.2	15°45.8	-9.7	59.9
3	224°56.7	9°37.8	99°06.9	7.3	15°36.0	-9.8	59.9
4	239°56.9	9°38.7	113°33.2	7.3	15°26.2	-9.9	59.9
5	254°57.1	9°39.5	127°59.6	7.4	15°16.2	-10.0	59.9
6	269°57.2	9°40.4	142°26.0	7.4	15°06.1	-10.1	59.9
7	284°57.4	9°41.3	156°52.4	7.4	14°55.9	-10.2	59.9
8	299°57.5	9°42.2	171°18.8	7.5	14°45.7	-10.3	60.0
9	314°57.7	9°43.1	185°45.3	7.5	14°35.3	-10.4	60.0
10	329°57.8	9°44.0	200°11.9	7.6	14°24.8	-10.5	60.0
11	344°58.0	9°44.9	214°38.5	7.6	14°14.2	-10.6	60.0
12	359°58.1	9°45.8	229°05.1	7.6	14°03.6	-10.7	60.0
13	14°58.3	9°46.7	243°31.7	7.7	13°52.8	-10.8	60.0
14	29°58.4	9°47.6	257°58.4	7.7	13°42.0	-10.9	60.0
15	44°58.6	9°48.5	272°25.2	7.8	13°31.0	-11.0	60.0
16	59°58.7	9°49.4	286°52.0	7.8	13°20.0	-11.1	60.0
17	74°58.9	9°50.3	301°18.8	7.8	13°08.9	-11.2	60.1
18	89°59.0	9°51.2	315°45.7	7.9	12°57.7	-11.2	60.1
19	104°59.2	9°52.1	330°12.6	7.9	12°46.4	-11.3	60.1
20	119°59.3	9°52.9	344°39.5	8.0	12°35.0	-11.4	60.1
21	134°59.5	9°53.8	359°06.5	8.0	12°23.6	-11.5	60.1
22	149°59.6	9°54.7	13°33.5	8.0	12°12.0	-11.6	60.1
23	164°59.8	9°55.6	28°00.6	8.1	12°00.4	-11.7	60.1
	SD.=15.9	d=0.9			S.D.=16.3		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:10	03:47	20:18	21:58	–:–
70	–:–	02:43	04:03	20:01	21:22	–:–
68	01:01	03:07	04:15	19:48	20:58	23:15
66	01:52	03:25	04:25	19:38	20:39	22:15
64	02:22	03:40	04:34	19:29	20:24	21:43
62	02:44	03:52	04:41	19:21	20:11	21:20
60	03:01	04:02	04:48	19:15	20:01	21:02
58	03:16	04:11	04:53	19:09	19:52	20:48
56	03:28	04:18	04:58	19:04	19:44	20:35
54	03:38	04:25	05:02	18:60	19:37	20:25
52	03:47	04:31	05:06	18:55	19:31	20:16
50	03:54	04:36	05:10	18:52	19:26	20:08
45	04:11	04:47	05:18	18:44	19:14	19:51
40	04:23	04:56	05:24	18:37	19:05	19:39
35	04:33	05:04	05:30	18:31	18:57	19:28
30	04:41	05:10	05:35	18:26	18:51	19:20
20	04:55	05:21	05:43	18:18	18:40	19:07
10	05:04	05:29	05:50	18:10	18:32	18:57
0	05:12	05:36	05:57	18:04	18:25	18:49
-10	05:18	05:42	06:04	17:57	18:18	18:43
-20	05:23	05:48	06:11	17:50	18:12	18:38
-30	05:26	05:54	06:18	17:42	18:06	18:34
-35	05:28	05:57	06:23	17:38	18:03	18:33
-40	05:29	06:00	06:28	17:33	17:60	18:31
-45	05:30	06:04	06:33	17:27	17:56	18:30
-50	05:30	06:07	06:40	17:20	17:52	18:30
-52	05:30	06:09	06:43	17:17	17:51	18:30
-54	05:30	06:11	06:47	17:13	17:49	18:30
-56	05:30	06:13	06:51	17:09	17:47	18:30
-58	05:29	06:15	06:55	17:05	17:45	18:30
-60	05:29	06:17	06:60	17:00	17:42	18:31

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	11:21	–:–	–:–	06:11
70	–:–	09:30	11:52	–:–	06:02	05:39
68	08:09	10:13	12:14	05:21	05:19	05:16
66	08:57	10:41	12:31	04:33	04:50	04:57
64	09:27	11:02	12:45	04:02	04:27	04:42
62	09:50	11:20	12:56	03:39	04:10	04:30
60	10:08	11:34	13:06	03:21	03:55	04:19
58	10:24	11:46	13:15	03:05	03:42	04:09
56	10:37	11:57	13:22	02:52	03:31	04:01
54	10:48	12:06	13:29	02:40	03:21	03:54
52	10:58	12:14	13:35	02:30	03:13	03:47
50	11:07	12:21	13:41	02:21	03:05	03:41
45	11:26	12:37	13:52	02:01	02:48	03:28
40	11:41	12:50	14:02	01:46	02:34	03:17
35	11:54	13:01	14:10	01:32	02:23	03:08
30	12:05	13:11	14:17	01:21	02:12	02:60
20	12:25	13:27	14:30	01:01	01:55	02:46
10	12:41	13:41	14:41	00:43	01:39	02:33
0	12:57	13:55	14:51	00:27	01:25	02:21
-10	13:13	14:08	15:01	00:10	01:10	02:10
-20	13:29	14:22	15:11	–:–	00:54	01:57
-30	13:49	14:38	15:24	–:–	00:36	01:42
-35	13:60	14:48	15:31	–:–	00:25	01:34
-40	14:13	14:58	15:39	–:–	00:13	01:24
-45	14:28	15:11	15:48	23:59	–:–	01:12
-50	14:46	15:26	15:59	23:41	–:–	00:58
-52	14:55	15:33	16:04	23:33	–:–	00:52
-54	15:05	15:41	16:10	23:23	–:–	00:44
-56	15:15	15:50	16:16	23:13	–:–	00:36
-58	15:28	15:60	16:23	23:01	–:–	00:27
-60	15:43	16:11	16:31	22:47	–:–	00:16

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	00:45	00:37	12:00	19:10	06:41	8(58%)
14	00:30	00:22	12:00	20:08	07:39	9(69%)
15	00:15	00:08	12:00	21:03	08:36	10(79%)

April 16, 17 ,18 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	203°51.0	208°28.6	-3°33.1	135°14.4	22°59.9	300°01.3	-22°40.8	271°53.7	-21°29.8
1	218°53.4	223°28.3	-3°31.9	150°15.1	23°00.1	315°03.8	-22°40.8	286°56.1	-21°29.8
2	233°55.9	238°27.9	-3°30.8	165°15.8	23°00.4	330°06.3	-22°40.8	301°58.5	-21°29.8
3	248°58.3	253°27.6	-3°29.6	180°16.5	23°00.6	345°08.8	-22°40.8	317°00.9	-21°29.8
4	264°00.8	268°27.2	-3°28.5	195°17.2	23°00.9	0°11.3	-22°40.8	332°03.3	-21°29.8
5	279°03.3	283°26.9	-3°27.4	210°17.9	23°01.1	15°13.8	-22°40.8	347°05.7	-21°29.8
6	294°05.7	298°26.5	-3°26.2	225°18.6	23°01.4	30°16.3	-22°40.8	2°08.1	-21°29.8
7	309°08.2	313°26.2	-3°25.1	240°19.3	23°01.6	45°18.9	-22°40.8	17°10.5	-21°29.8
8	324°10.7	328°25.9	-3°23.9	255°20.0	23°01.9	60°21.4	-22°40.8	32°12.9	-21°29.7
9	339°13.1	343°25.5	-3°22.8	270°20.7	23°02.1	75°23.9	-22°40.8	47°15.3	-21°29.7
10	354°15.6	358°25.2	-3°21.6	285°21.4	23°02.4	90°26.4	-22°40.8	62°17.7	-21°29.7
11	9°18.1	13°24.8	-3°20.5	300°22.1	23°02.6	105°28.9	-22°40.8	77°20.1	-21°29.7
12	24°20.5	28°24.5	-3°19.4	315°22.8	23°02.9	120°31.4	-22°40.8	92°22.5	-21°29.7
13	39°23.0	43°24.2	-3°18.2	330°23.5	23°03.1	135°33.9	-22°40.8	107°24.9	-21°29.7
14	54°25.5	58°23.8	-3°17.1	345°24.2	23°03.4	150°36.4	-22°40.7	122°27.3	-21°29.7
15	69°27.9	73°23.5	-3°15.9	0°24.9	23°03.6	165°39.0	-22°40.7	137°29.7	-21°29.7
16	84°30.4	88°23.2	-3°14.8	15°25.6	23°03.8	180°41.5	-22°40.7	152°32.1	-21°29.7
17	99°32.8	103°22.8	-3°13.6	30°26.3	23°04.1	195°44.0	-22°40.7	167°34.5	-21°29.7
18	114°35.3	118°22.5	-3°12.5	45°27.0	23°04.3	210°46.5	-22°40.7	182°36.9	-21°29.7
19	129°37.8	133°22.1	-3°11.3	60°27.7	23°04.6	225°49.0	-22°40.7	197°39.4	-21°29.7
20	144°40.2	148°21.8	-3°10.2	75°28.4	23°04.8	240°51.5	-22°40.7	212°41.8	-21°29.7
21	159°42.7	163°21.5	-3°09.1	90°29.1	23°05.1	255°54.0	-22°40.7	227°44.2	-21°29.7
22	174°45.2	178°21.1	-3°07.9	105°29.8	23°05.3	270°56.6	-22°40.7	242°46.6	-21°29.7
23	189°47.6	193°20.8	-3°06.8	120°30.5	23°05.6	285°59.1	-22°40.7	257°49.0	-21°29.6
Mer.pass.:10:22		v-0.3 d1.1 m-3.8		v0.7 d0.3 m1.6		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	204°50.1	208°20.4	-3°05.6	135°31.2	23°05.8	301°01.6	-22°40.7	272°51.4	-21°29.6
1	219°52.6	223°20.1	-3°04.5	150°31.9	23°06.0	316°04.1	-22°40.7	287°53.8	-21°29.6
2	234°55.0	238°19.8	-3°03.3	165°32.6	23°06.3	331°06.6	-22°40.7	302°56.2	-21°29.6
3	249°57.5	253°19.4	-3°02.2	180°33.3	23°06.5	346°09.1	-22°40.7	317°58.6	-21°29.6
4	264°59.9	268°19.1	-3°01.0	195°34.0	23°06.8	1°11.7	-22°40.7	333°01.0	-21°29.6
5	280°02.4	283°18.8	-2°59.9	210°34.7	23°07.0	16°14.2	-22°40.7	348°03.4	-21°29.6
6	295°04.9	298°18.4	-2°58.7	225°35.4	23°07.2	31°16.7	-22°40.7	3°05.8	-21°29.6
7	310°07.3	313°18.1	-2°57.6	240°36.1	23°07.5	46°19.2	-22°40.7	18°08.2	-21°29.6
8	325°09.8	328°17.7	-2°56.4	255°36.8	23°07.7	61°21.7	-22°40.7	33°10.6	-21°29.6
9	340°12.3	343°17.4	-2°55.3	270°37.5	23°08.0	76°24.3	-22°40.7	48°13.1	-21°29.6
10	355°14.7	358°17.1	-2°54.1	285°38.2	23°08.2	91°26.8	-22°40.7	63°15.5	-21°29.6
11	10°17.2	13°16.7	-2°53.0	300°38.9	23°08.4	106°29.3	-22°40.7	78°17.9	-21°29.6
12	25°19.7	28°16.4	-2°51.9	315°39.6	23°08.7	121°31.8	-22°40.7	93°20.3	-21°29.6
13	40°22.1	43°16.1	-2°50.7	330°40.3	23°08.9	136°34.3	-22°40.7	108°22.7	-21°29.6
14	55°24.6	58°15.7	-2°49.6	345°41.0	23°09.2	151°36.9	-22°40.7	123°25.1	-21°29.6
15	70°27.1	73°15.4	-2°48.4	0°41.7	23°09.4	166°39.4	-22°40.7	138°27.5	-21°29.5
16	85°29.5	88°15.1	-2°47.3	15°42.5	23°09.6	181°41.9	-22°40.7	153°29.9	-21°29.5
17	100°32.0	103°14.7	-2°46.1	30°43.2	23°09.9	196°44.4	-22°40.7	168°32.3	-21°29.5
18	115°34.4	118°14.4	-2°45.0	45°43.9	23°10.1	211°47.0	-22°40.7	183°34.7	-21°29.5
19	130°36.9	133°14.0	-2°43.8	60°44.6	23°10.4	226°49.5	-22°40.7	198°37.2	-21°29.5
20	145°39.4	148°13.7	-2°42.7	75°45.3	23°10.6	241°52.0	-22°40.7	213°39.6	-21°29.5
21	160°41.8	163°13.4	-2°41.5	90°46.0	23°10.8	256°54.5	-22°40.7	228°42.0	-21°29.5
22	175°44.3	178°13.0	-2°40.4	105°46.7	23°11.1	271°57.1	-22°40.7	243°44.4	-21°29.5
23	190°46.8	193°12.7	-2°39.2	120°47.4	23°11.3	286°59.6	-22°40.7	258°46.8	-21°29.5
Mer.pass.:10:18		v-0.3 d1.1 m-3.8		v0.7 d0.2 m1.6		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	205°49.2	208°12.4	-2°38.1	135°48.0	23°11.5	302°02.1	-22°40.7	273°49.2	-21°29.5
1	220°51.7	223°12.0	-2°36.9	150°48.7	23°11.8	317°04.6	-22°40.7	288°51.6	-21°29.5
2	235°54.2	238°11.7	-2°35.8	165°49.4	23°12.0	332°07.2	-22°40.7	303°54.0	-21°29.5
3	250°56.6	253°11.4	-2°34.6	180°50.1	23°12.2	347°09.7	-22°40.7	318°56.4	-21°29.5
4	265°59.1	268°11.0	-2°33.5	195°50.8	23°12.5	2°12.2	-22°40.7	333°58.9	-21°29.5
5	281°01.5	283°10.7	-2°32.3	210°51.5	23°12.7	17°14.7	-22°40.7	349°01.3	-21°29.5
6	296°04.0	298°10.3	-2°31.2	225°52.2	23°12.9	32°17.3	-22°40.7	4°03.7	-21°29.5
7	311°06.5	313°10.0	-2°30.0	240°52.9	23°13.2	47°19.8	-22°40.7	19°06.1	-21°29.5
8	326°08.9	328°09.7	-2°28.9	255°53.6	23°13.4	62°22.3	-22°40.7	34°08.5	-21°29.5
9	341°11.4	343°09.3	-2°27.7	270°54.3	23°13.6	77°24.9	-22°40.7	49°10.9	-21°29.4
10	356°13.9	358°09.0	-2°26.6	285°55.0	23°13.9	92°27.4	-22°40.7	64°13.3	-21°29.4
11	11°16.3	13°08.7	-2°25.4	300°55.7	23°14.1	107°29.9	-22°40.7	79°15.8	-21°29.4
12	26°18.8	28°08.3	-2°24.2	315°56.4	23°14.3	122°32.4	-22°40.6	94°18.2	-21°29.4
13	41°21.3	43°08.0	-2°23.1	330°57.1	23°14.6	137°35.0	-22°40.6	109°20.6	-21°29.4
14	56°23.7	58°07.7	-2°21.9	345°57.8	23°14.8	152°37.5	-22°40.6	124°23.0	-21°29.4
15	71°26.2	73°07.3	-2°20.8	0°58.5	23°15.0	167°40.0	-22°40.6	139°25.4	-21°29.4
16	86°28.7	88°07.0	-2°19.6	15°59.2	23°15.2	182°42.6	-22°40.6	154°27.8	-21°29.4
17	101°31.1	103°06.7	-2°18.5	30°59.9	23°15.5	197°45.1	-22°40.6	169°30.2	-21°29.4
18	116°33.6	118°06.3	-2°17.3	46°00.6	23°15.7	212°47.6	-22°40.6	184°32.7	-21°29.4
19	131°36.0	133°06.0	-2°16.2	61°01.3	23°15.9	227°50.2	-22°40.6	199°35.1	-21°29.4
20	146°38.5	148°05.7	-2°15.0	76°02.0	23°16.2	242°52.7	-22°40.6	214°37.5	-21°29.4
21	161°41.0	163°05.3	-2°13.9	91°02.7	23°16.4	257°55.2	-22°40.6	229°39.9	-21°29.4
22	176°43.4	178°05.0	-2°12.7	106°03.4	23°16.6	272°57.8	-22°40.6	244°42.3	-21°29.4
23	191°45.9	193°04.7	-2°11.6	121°04.1	23°16.8	288°00.3	-22°40.6	259°44.7	-21°29.4
Mer.pass.:10:15		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Stars	SHA	Dec
Alpheratz	357°39.7	29°11.6
Ankaa	353°12.2	-42°12.2
Schedar	349°36.6	56°38.3
Diphda	348°52.1	-17°53.1
Achernar	335°24.4	-57°08.5
Hamal	327°56.7	23°33.0
Polaris	316°29.5	89°20.7
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.4	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°27.9	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.7
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.6	-52°42.8
Sirius	258°30.2	-16°44.7
Adara	255°09.5	-29°00.3
Procyon	244°55.5	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.3	-59°34.6
Suhail	222°49.4	-43°30.9
Miaplacidus	221°38.6	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.1	11°52.3
Dubhe	193°46.3	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.4
Gacrux	171°55.9	-57°13.3
Alioth	166°16.7	55°51.4
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.6	-60°27.8
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.2
Rigil Kent.	139°45.7	-60°54.7
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.0	74°04.6
Alphecca	126°07.3	26°39.0
Antares	112°21.1	-26°28.3
Atria	107°19.0	-69°03.4
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.8
Rasalhague	96°02.6	12°32.8
Etamin	90°44.1	51°29.0
Kaus Aust.	83°38.4	-34°22.3
Vega	80°36.2	38°47.9
Nunki	75°53.3	-26°16.2
Altair	62°04.5	8°55.0
Peacock	53°13.1	-56°40.1
Deneb	49°28.9	45°20.7
Enif	33°43.4	9°57.6
Alnair	27°39.1	-46°52.0
Fomalhaut	15°19.9	-29°31.3
Scheat	13°49.8	28°10.9
Markab	13°34.7	15°18.3

2019/4/1	SHA	Mer.pass
Venus	4°37.6	10:06
Mars	291°23.4	14:58
Jupiter	96°10.3	03:59
Saturn	68°02.7	05:51

2019/4/1	SHA	Mer.pass
Venus	3°30.4	10:07
Mars	290°41.1	14:57
Jupiter	96°11.5	03:55
Saturn	68°01.3	05:48

2019/4/1	SHA	Mer.pass
Venus	2°23.1	10:07
Mars	289°58.8	14:56
Jupiter	96°12.9	03:51
Saturn	67°60.0	05:44

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°59.9	9°56.5	42°27.7	8.1	11°48.7	-11.7	60.1
1	195°00.1	9°57.4	56°54.8	8.2	11°37.0	-11.8	60.1
2	210°00.2	9°58.3	71°22.0	8.2	11°25.1	-11.9	60.1
3	225°00.4	9°59.2	85°49.2	8.2	11°13.2	-12.0	60.1
4	240°00.5	10°00.1	100°16.4	8.3	11°01.2	-12.0	60.1
5	255°00.7	10°01.0	114°43.7	8.3	10°49.1	-12.1	60.2
6	270°00.8	10°01.8	129°11.1	8.3	10°37.0	-12.2	60.2
7	285°01.0	10°02.7	143°38.4	8.4	10°24.8	-12.2	60.2
8	300°01.1	10°03.6	158°05.8	8.4	10°12.5	-12.3	60.2
9	315°01.3	10°04.5	172°33.3	8.5	10°00.2	-12.4	60.2
10	330°01.4	10°05.4	187°00.8	8.5	9°47.8	-12.4	60.2
11	345°01.6	10°06.3	201°28.3	8.5	9°35.3	-12.5	60.2
12	0°01.7	10°07.2	215°55.8	8.6	9°22.8	-12.6	60.2
13	15°01.9	10°08.1	230°23.4	8.6	9°10.2	-12.6	60.2
14	30°02.0	10°08.9	244°51.0	8.6	8°57.6	-12.7	60.2
15	45°02.2	10°09.8	259°18.7	8.7	8°44.9	-12.7	60.2
16	60°02.3	10°10.7	273°46.4	8.7	8°32.1	-12.8	60.2
17	75°02.5	10°11.6	288°14.1	8.7	8°19.3	-12.8	60.2
18	90°02.6	10°12.5	302°41.9	8.8	8°06.5	-12.9	60.2
19	105°02.8	10°13.4	317°09.6	8.8	7°53.6	-12.9	60.2
20	120°02.9	10°14.3	331°37.5	8.8	7°40.6	-13.0	60.2
21	135°03.1	10°15.1	346°05.3	8.9	7°27.6	-13.0	60.2
22	150°03.2	10°16.0	0°33.2	8.9	7°14.6	-13.1	60.2
23	165°03.4	10°16.9	15°01.1	8.9	7°01.5	-13.1	60.2
	SD.=15.9	d=0.9			S.D.=16.4		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°03.5	10°17.8	29°29.1	9.0	6°48.3	-13.2	60.2
1	195°03.6	10°18.7	43°57.1	9.0	6°35.1	-13.2	60.2
2	210°03.8	10°19.6	58°25.1	9.0	6°21.9	-13.2	60.2
3	225°03.9	10°20.4	72°53.1	9.1	6°08.7	-13.3	60.2
4	240°04.1	10°21.3	87°21.2	9.1	5°55.4	-13.3	60.2
5	255°04.2	10°22.2	101°49.3	9.1	5°42.0	-13.3	60.2
6	270°04.4	10°23.1	116°17.4	9.1	5°28.7	-13.4	60.2
7	285°04.5	10°24.0	130°45.5	9.2	5°15.3	-13.4	60.2
8	300°04.7	10°24.8	145°13.7	9.2	5°01.8	-13.4	60.2
9	315°04.8	10°25.7	159°41.9	9.2	4°48.4	-13.5	60.2
10	330°05.0	10°26.6	174°10.1	9.2	4°34.9	-13.5	60.2
11	345°05.1	10°27.5	188°38.4	9.3	4°21.4	-13.5	60.2
12	0°05.2	10°28.4	203°06.7	9.3	4°07.8	-13.5	60.2
13	15°05.4	10°29.2	217°35.0	9.3	3°54.3	-13.6	60.2
14	30°05.5	10°30.1	232°03.3	9.3	3°40.7	-13.6	60.2
15	45°05.7	10°31.0	246°31.6	9.4	3°27.1	-13.6	60.1
16	60°05.8	10°31.9	261°00.0	9.4	3°13.5	-13.6	60.1
17	75°06.0	10°32.8	275°28.4	9.4	2°59.8	-13.6	60.1
18	90°06.1	10°33.6	289°56.8	9.4	2°46.2	-13.7	60.1
19	105°06.3	10°34.5	304°25.2	9.4	2°32.5	-13.7	60.1
20	120°06.4	10°35.4	318°53.7	9.5	2°18.8	-13.7	60.1
21	135°06.5	10°36.3	333°22.2	9.5	2°05.1	-13.7	60.1
22	150°06.7	10°37.1	347°50.6	9.5	1°51.4	-13.7	60.1
23	165°06.8	10°38.0	2°19.1	9.5	1°37.7	-13.7	60.1
	SD.=15.9	d=0.9			S.D.=16.4		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°07.0	10°38.9	16°47.7	9.5	1°24.0	-13.7	60.1
1	195°07.1	10°39.8	31°16.2	9.5	1°10.3	-13.7	60.1
2	210°07.3	10°40.6	45°44.8	9.6	0°56.6	-13.7	60.1
3	225°07.4	10°41.5	60°13.3	9.6	0°42.9	-13.7	60.0
4	240°07.5	10°42.4	74°41.9	9.6	0°29.1	-13.7	60.0
5	255°07.7	10°43.3	89°10.5	9.6	0°15.4	-13.7	60.0
6	270°07.8	10°44.1	103°39.1	9.6	0°01.7	-13.7	60.0
7	285°08.0	10°45.0	118°07.8	9.6	-0°12.0	-13.7	60.0
8	300°08.1	10°45.9	132°36.4	9.6	-0°25.7	-13.7	60.0
9	315°08.3	10°46.8	147°05.0	9.7	-0°39.4	-13.7	60.0
10	330°08.4	10°47.6	161°33.7	9.7	-0°53.1	-13.7	60.0
11	345°08.5	10°48.5	176°02.4	9.7	-1°06.8	-13.7	59.9
12	0°08.7	10°49.4	190°31.1	9.7	-1°20.5	-13.7	59.9
13	15°08.8	10°50.3	204°59.8	9.7	-1°34.1	-13.6	59.9
14	30°09.0	10°51.1	219°28.5	9.7	-1°47.8	-13.6	59.9
15	45°09.1	10°52.0	233°57.2	9.7	-2°01.4	-13.6	59.9
16	60°09.2	10°52.9	248°25.9	9.7	-2°15.0	-13.6	59.9
17	75°09.4	10°53.7	262°54.6	9.7	-2°28.6	-13.6	59.8
18	90°09.5	10°54.6	277°23.3	9.7	-2°42.1	-13.6	59.8
19	105°09.7	10°55.5	291°52.1	9.7	-2°55.7	-13.5	59.8
20	120°09.8	10°56.3	306°20.8	9.7	-3°09.2	-13.5	59.8
21	135°09.9	10°57.2	320°49.5	9.7	-3°22.7	-13.5	59.8
22	150°10.1	10°58.1	335°18.3	9.8	-3°36.1	-13.5	59.8
23	165°10.2	10°59.0	349°47.0	9.8	-3°49.6	-13.4	59.7
	SD.=15.9	d=0.9			S.D.=16.4		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	01:41	03:29	20:34	22:28	–:–
70	–:–	02:23	03:48	20:15	21:42	–:–
68	–:–	02:50	04:02	20:00	21:13	–:–
66	01:27	03:11	04:14	19:48	20:51	22:41
64	02:04	03:27	04:23	19:38	20:35	21:60
62	02:30	03:41	04:32	19:30	20:21	21:33
60	02:49	03:52	04:39	19:22	20:09	21:13
58	03:05	04:02	04:45	19:16	19:60	20:57
56	03:18	04:10	04:50	19:10	19:51	20:43
54	03:29	04:17	04:55	19:05	19:43	20:32
52	03:39	04:24	04:60	19:01	19:37	20:22
50	03:47	04:30	05:04	18:56	19:31	20:14
45	04:05	04:42	05:13	18:47	19:18	19:56
40	04:18	04:52	05:20	18:40	19:08	19:42
35	04:29	04:60	05:26	18:34	18:60	19:31
30	04:38	05:07	05:32	18:28	18:53	19:22
20	04:52	05:18	05:41	18:19	18:41	19:08
10	05:03	05:27	05:49	18:11	18:32	18:57
0	05:11	05:35	05:56	18:03	18:24	18:48
-10	05:18	05:42	06:04	17:55	18:17	18:41
-20	05:23	05:49	06:11	17:48	18:10	18:36
-30	05:28	05:56	06:20	17:39	18:03	18:31
-35	05:30	05:59	06:25	17:34	17:59	18:29
-40	05:32	06:03	06:31	17:28	17:56	18:27
-45	05:33	06:07	06:37	17:22	17:51	18:25
-50	05:34	06:12	06:45	17:14	17:47	18:24
-52	05:35	06:14	06:48	17:10	17:44	18:24
-54	05:35	06:16	06:52	17:06	17:42	18:23
-56	05:35	06:18	06:57	17:02	17:40	18:23
-58	05:35	06:21	07:01	16:57	17:37	18:23
-60	05:36	06:24	07:07	16:51	17:34	18:23

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
72	13:46	15:58	18:06	05:42	05:22	05:04
70	14:00	16:02	18:02	05:25	05:14	05:04
68	14:11	16:06	17:59	05:12	05:08	05:04
66	14:21	16:09	17:56	05:01	05:03	05:04
64	14:29	16:12	17:54	04:52	04:58	05:04
62	14:35	16:14	17:52	04:44	04:55	05:04
60	14:41	16:16	17:50	04:37	04:51	05:04
58	14:46	16:18	17:48	04:31	04:48	05:04
56	14:51	16:19	17:47	04:25	04:45	05:04
54	14:55	16:20	17:46	04:20	04:43	05:04
52	14:58	16:22	17:44	04:16	04:41	05:04
50	15:02	16:23	17:43	04:12	04:39	05:04
45	15:09	16:25	17:41	04:03	04:34	05:03
40	15:15	16:27	17:39	03:56	04:30	05:03
35	15:20	16:29	17:38	03:49	04:27	05:03
30	15:24	16:31	17:36	03:43	04:24	05:03
20	15:32	16:33	17:34	03:34	04:19	05:03
10	15:39	16:36	17:32	03:25	04:15	05:03
0	15:45	16:38	17:30	03:17	04:10	05:03
-10	15:51	16:40	17:28	03:08	04:06	05:03
-20	15:58	16:43	17:26	02:59	04:01	05:02
-30	16:06	16:45	17:24	02:49	03:56	05:02
-35	16:10	16:47	17:23	02:43	03:53	05:02
-40	16:15	16:49	17:21	02:36	03:49	05:02
-45	16:21	16:51	17:20	02:28	03:45	05:01
-50	16:28	16:53	17:18	02:19	03:40	05:01
-52	16:31	16:54	17:17	02:14	03:38	05:01
-54	16:34	16:56	17:16	02:09	03:35	05:01
-56	16:38	16:57	17:15	02:04	03:32	05:01
-58	16:42	16:59	17:14	01:58	03:29	05:00
-60	16:47	17:00	17:13	01:51	03:26	05:00

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	00:00	00:07	11:59	21:57	09:30	11(88%)
17	00:14	00:21	11:59	22:50	10:24	12(95%)
18	00:28	00:35	11:59	23:42	11:16	13(99%)

April 19, 20 ,21 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	206°48.4	208°04.3	-2°10.4	136°04.8	23°17.1	303°02.8	-22°40.6	274°47.1	-21°29.4
1	221°50.8	223°04.0	-2°09.3	151°05.5	23°17.3	318°05.4	-22°40.6	289°49.6	-21°29.4
2	236°53.3	238°03.7	-2°08.1	166°06.2	23°17.5	333°07.9	-22°40.6	304°52.0	-21°29.4
3	251°55.8	253°03.3	-2°06.9	181°06.9	23°17.8	348°10.4	-22°40.6	319°54.4	-21°29.4
4	266°58.2	268°03.0	-2°05.8	196°07.6	23°18.0	3°13.0	-22°40.6	334°56.8	-21°29.3
5	282°00.7	283°02.7	-2°04.6	211°08.3	23°18.2	18°15.5	-22°40.6	349°59.2	-21°29.3
6	297°03.1	298°02.3	-2°03.5	226°09.0	23°18.4	33°18.0	-22°40.6	5°01.6	-21°29.3
7	312°05.6	313°02.0	-2°02.3	241°09.7	23°18.7	48°20.6	-22°40.6	20°04.1	-21°29.3
8	327°08.1	328°01.7	-2°01.2	256°10.4	23°18.9	63°23.1	-22°40.6	35°06.5	-21°29.3
9	342°10.5	343°01.3	-2°00.0	271°11.1	23°19.1	78°25.6	-22°40.6	50°08.9	-21°29.3
10	357°13.0	358°01.0	-1°58.9	286°11.8	23°19.3	93°28.2	-22°40.6	65°11.3	-21°29.3
11	12°15.5	13°00.7	-1°57.7	301°12.5	23°19.6	108°30.7	-22°40.6	80°13.7	-21°29.3
12	27°17.9	28°00.3	-1°56.6	316°13.2	23°19.8	123°33.3	-22°40.6	95°16.1	-21°29.3
13	42°20.4	42°60.0	-1°55.4	331°13.9	23°20.0	138°35.8	-22°40.6	110°18.6	-21°29.3
14	57°22.9	57°59.7	-1°54.2	346°14.6	23°20.2	153°38.3	-22°40.6	125°21.0	-21°29.3
15	72°25.3	72°59.3	-1°53.1	1°15.3	23°20.4	168°40.9	-22°40.6	140°23.4	-21°29.3
16	87°27.8	87°59.0	-1°51.9	16°16.0	23°20.7	183°43.4	-22°40.6	155°25.8	-21°29.3
17	102°30.3	102°58.7	-1°50.8	31°16.7	23°20.9	198°45.9	-22°40.6	170°28.2	-21°29.3
18	117°32.7	117°58.3	-1°49.6	46°17.4	23°21.1	213°48.5	-22°40.6	185°30.7	-21°29.3
19	132°35.2	132°58.0	-1°48.5	61°18.1	23°21.3	228°51.0	-22°40.6	200°33.1	-21°29.3
20	147°37.6	147°57.7	-1°47.3	76°18.8	23°21.6	243°53.6	-22°40.6	215°35.5	-21°29.3
21	162°40.1	162°57.3	-1°46.1	91°19.5	23°21.8	258°56.1	-22°40.6	230°37.9	-21°29.3
22	177°42.6	177°57.0	-1°45.0	106°20.2	23°22.0	273°58.7	-22°40.6	245°40.3	-21°29.3
23	192°45.0	192°56.7	-1°43.8	121°20.9	23°22.2	289°01.2	-22°40.6	260°42.8	-21°29.3
Mer.pass.:10:11		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	207°47.5	207°56.3	-1°42.7	136°21.6	23°22.4	304°03.7	-22°40.6	275°45.2	-21°29.3
1	222°50.0	222°56.0	-1°41.5	151°22.3	23°22.6	319°06.3	-22°40.5	290°47.6	-21°29.2
2	237°52.4	237°55.7	-1°40.4	166°23.0	23°22.9	334°08.8	-22°40.5	305°50.0	-21°29.2
3	252°54.9	252°55.3	-1°39.2	181°23.7	23°23.1	349°11.4	-22°40.5	320°52.4	-21°29.2
4	267°57.4	267°55.0	-1°38.0	196°24.4	23°23.3	4°13.9	-22°40.5	335°54.9	-21°29.2
5	282°59.8	282°54.7	-1°36.9	211°25.1	23°23.5	19°16.5	-22°40.5	350°57.3	-21°29.2
6	298°02.3	297°54.3	-1°35.7	226°25.8	23°23.7	34°19.0	-22°40.5	5°59.7	-21°29.2
7	313°04.8	312°54.0	-1°34.6	241°26.4	23°24.0	49°21.5	-22°40.5	21°02.1	-21°29.2
8	328°07.2	327°53.7	-1°33.4	256°27.1	23°24.2	64°24.1	-22°40.5	36°04.5	-21°29.2
9	343°09.7	342°53.4	-1°32.2	271°27.8	23°24.4	79°26.6	-22°40.5	51°07.0	-21°29.2
10	358°12.1	357°53.0	-1°31.1	286°28.5	23°24.6	94°29.2	-22°40.5	66°09.4	-21°29.2
11	13°14.6	12°52.7	-1°29.9	301°29.2	23°24.8	109°31.7	-22°40.5	81°11.8	-21°29.2
12	28°17.1	27°52.4	-1°28.8	316°29.9	23°25.0	124°34.3	-22°40.5	96°14.2	-21°29.2
13	43°19.5	42°52.0	-1°27.6	331°30.6	23°25.2	139°36.8	-22°40.5	111°16.7	-21°29.2
14	58°22.0	57°51.7	-1°26.4	346°31.3	23°25.5	154°39.4	-22°40.5	126°19.1	-21°29.2
15	73°24.5	72°51.4	-1°25.3	1°32.0	23°25.7	169°41.9	-22°40.5	141°21.5	-21°29.2
16	88°26.9	87°51.0	-1°24.1	16°32.7	23°25.9	184°44.5	-22°40.5	156°23.9	-21°29.2
17	103°29.4	102°50.7	-1°23.0	31°33.4	23°26.1	199°47.0	-22°40.5	171°26.3	-21°29.2
18	118°31.9	117°50.4	-1°21.8	46°34.1	23°26.3	214°49.6	-22°40.5	186°28.8	-21°29.2
19	133°34.3	132°50.0	-1°20.7	61°34.8	23°26.5	229°52.1	-22°40.5	201°31.2	-21°29.2
20	148°36.8	147°49.7	-1°19.5	76°35.5	23°26.7	244°54.6	-22°40.5	216°33.6	-21°29.2
21	163°39.2	162°49.4	-1°18.3	91°36.2	23°27.0	259°57.2	-22°40.5	231°36.0	-21°29.2
22	178°41.7	177°49.0	-1°17.2	106°36.9	23°27.2	274°59.7	-22°40.5	246°38.5	-21°29.2
23	193°44.2	192°48.7	-1°16.0	121°37.6	23°27.4	290°02.3	-22°40.5	261°40.9	-21°29.2
Mer.pass.:10:07		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.5 d0.0 m-2.2		v2.4 d0.0 m0.5	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	208°46.6	207°48.4	-1°14.8	136°38.3	23°27.6	305°04.8	-22°40.5	276°43.3	-21°29.1
1	223°49.1	222°48.1	-1°13.7	151°39.0	23°27.8	320°07.4	-22°40.5	291°45.7	-21°29.1
2	238°51.6	237°47.7	-1°12.5	166°39.7	23°28.0	335°09.9	-22°40.5	306°48.2	-21°29.1
3	253°54.0	252°47.4	-1°11.4	181°40.4	23°28.2	350°12.5	-22°40.5	321°50.6	-21°29.1
4	268°56.5	267°47.1	-1°10.2	196°41.1	23°28.4	5°15.1	-22°40.5	336°53.0	-21°29.1
5	283°59.0	282°46.7	-1°09.0	211°41.8	23°28.6	20°17.6	-22°40.5	351°55.4	-21°29.1
6	299°01.4	297°46.4	-1°07.9	226°42.5	23°28.9	35°20.2	-22°40.5	6°57.9	-21°29.1
7	314°03.9	312°46.1	-1°06.7	241°43.2	23°29.1	50°22.7	-22°40.5	22°00.3	-21°29.1
8	329°06.4	327°45.7	-1°05.6	256°43.8	23°29.3	65°25.3	-22°40.5	37°02.7	-21°29.1
9	344°08.8	342°45.4	-1°04.4	271°44.5	23°29.5	80°27.8	-22°40.4	52°05.1	-21°29.1
10	359°11.3	357°45.1	-1°03.2	286°45.2	23°29.7	95°30.4	-22°40.4	67°07.6	-21°29.1
11	14°13.7	12°44.7	-1°02.1	301°45.9	23°29.9	110°32.9	-22°40.4	82°10.0	-21°29.1
12	29°16.2	27°44.4	-1°00.9	316°46.6	23°30.1	125°35.5	-22°40.4	97°12.4	-21°29.1
13	44°18.7	42°44.1	-0°59.8	331°47.3	23°30.3	140°38.0	-22°40.4	112°14.8	-21°29.1
14	59°21.1	57°43.8	-0°58.6	346°48.0	23°30.5	155°40.6	-22°40.4	127°17.3	-21°29.1
15	74°23.6	72°43.4	-0°57.4	1°48.7	23°30.7	170°43.1	-22°40.4	142°19.7	-21°29.1
16	89°26.1	87°43.1	-0°56.3	16°49.4	23°30.9	185°45.7	-22°40.4	157°22.1	-21°29.1
17	104°28.5	102°42.8	-0°55.1	31°50.1	23°31.1	200°48.3	-22°40.4	172°24.6	-21°29.1
18	119°31.0	117°42.4	-0°53.9	46°50.8	23°31.3	215°50.8	-22°40.4	187°27.0	-21°29.1
19	134°33.5	132°42.1	-0°52.8	61°51.5	23°31.5	230°53.4	-22°40.4	202°29.4	-21°29.1
20	149°35.9	147°41.8	-0°51.6	76°52.2	23°31.7	245°55.9	-22°40.4	217°31.8	-21°29.1
21	164°38.4	162°41.4	-0°50.5	91°52.9	23°32.0	260°58.5	-22°40.4	232°34.3	-21°29.1
22	179°40.9	177°41.1	-0°49.3	106°53.6	23°32.2	276°01.0	-22°40.4	247°36.7	-21°29.1
23	194°43.3	192°40.8	-0°48.1	121°54.3	23°32.4	291°03.6	-22°40.4	262°39.1	-21°29.1
Mer.pass.:10:03		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.2	-42°12.2
Schedar	349°36.6	56°38.3
Diphda	348°52.1	-17°53.1
Achernar	335°24.4	-57°08.5
Hamal	327°56.7	23°33.0
Polaris	316°29.9	89°20.7
Akamar	315°15.7	-40°14.0
Menkar	314°11.2	4°09.6
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.6	-52°42.8
Sirius	258°30.3	-16°44.7
Adara	255°09.5	-29°00.2
Procyon	244°55.5	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.4	-59°34.6
Suhail	222°49.4	-43°30.9
Miaplacidus	221°38.6	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.1	11°52.3
Dubhe	193°46.3	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.4
Gacrux	171°55.9	-57°13.3
Alioth	166°16.7	55°51.4
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.6	-60°27.8
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.2
Rigil Kent.	139°45.7	-60°54.7
Zubenelg.	137°00.7	-16°07.2
Kochab	137°18.9	74°04.6
Alphecca	126°07.3	26°39.0
Antares	112°21.1	-26°28.3
Atria	107°19.0	-69°03.4
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.8
Rasalhague	96°02.6	12°32.8
Etamin	90°44.0	51°29.0
Kaus Aust.	83°38.4	-34°22.3
Vega	80°36.2	38°47.9
Nunki	75°53.3	-26°16.2
Altair	62°04.4	8°55.0
Peacock	53°13.1	-56°40.1
Deneb	49°28.9	45°20.7
Enif	33°43.4	9°57.6
Alnair	27°39.0	-46°51.9
Fomalhaut	15°19.9	-29°31.2
Scheat	13°49.8	28°10.9
Markab	13°34.6	15°18.3

2019/4/1	SHA	Mer.pass
Venus	1°16.0	10:08
Mars	289°16.5	14:55
Jupiter	96°14.5	03:47
Saturn	67°58.8	05:40

2019/4/2	SHA	Mer.pass
Venus	0°08.8	10:08
Mars	288°34.1	14:54
Jupiter	96°16.2	03:43
Saturn	67°57.7	05:36

2019/4/2	SHA	Mer.pass
Venus	359°01.7	10:09
Mars	287°51.6	14:53
Jupiter	96°18.2	03:39
Saturn	67°56.7	05:32

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°10.4	10°59.8	4°15.8	9.8	-4°03.0	-13.4	59.7
1	195°10.5	11°00.7	18°44.6	9.8	-4°16.4	-13.4	59.7
2	210°10.6	11°01.6	33°13.3	9.8	-4°29.7	-13.3	59.7
3	225°10.8	11°02.4	47°42.1	9.8	-4°43.0	-13.3	59.7
4	240°10.9	11°03.3	62°10.8	9.8	-4°56.3	-13.3	59.6
5	255°11.0	11°04.2	76°39.6	9.8	-5°09.5	-13.2	59.6
6	270°11.2	11°05.0	91°08.4	9.8	-5°22.7	-13.2	59.6
7	285°11.3	11°05.9	105°37.1	9.8	-5°35.9	-13.1	59.6
8	300°11.5	11°06.8	120°05.9	9.8	-5°49.0	-13.1	59.6
9	315°11.6	11°07.6	134°34.7	9.8	-6°02.1	-13.1	59.5
10	330°11.7	11°08.5	149°03.4	9.8	-6°15.1	-13.0	59.5
11	345°11.9	11°09.4	163°32.2	9.8	-6°28.1	-13.0	59.5
12	0°12.0	11°10.2	178°00.9	9.8	-6°41.0	-12.9	59.5
13	15°12.1	11°11.1	192°29.7	9.7	-6°53.9	-12.9	59.4
14	30°12.3	11°11.9	206°58.4	9.7	-7°06.8	-12.8	59.4
15	45°12.4	11°12.8	221°27.2	9.7	-7°19.6	-12.8	59.4
16	60°12.5	11°13.7	235°55.9	9.7	-7°32.3	-12.7	59.4
17	75°12.7	11°14.5	250°24.6	9.7	-7°45.0	-12.7	59.4
18	90°12.8	11°15.4	264°53.4	9.7	-7°57.6	-12.6	59.3
19	105°13.0	11°16.3	279°22.1	9.7	-8°10.2	-12.5	59.3
20	120°13.1	11°17.1	293°50.8	9.7	-8°22.7	-12.5	59.3
21	135°13.2	11°18.0	308°19.5	9.7	-8°35.2	-12.4	59.2
22	150°13.4	11°18.8	322°48.2	9.7	-8°47.6	-12.4	59.2
23	165°13.5	11°19.7	337°16.9	9.7	-8°59.9	-12.3	59.2
	SD.=15.9	d=0.9			S.D.=16.3		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°13.6	11°20.6	351°45.6	9.7	-9°12.2	-12.2	59.2
1	195°13.8	11°21.4	6°14.3	9.7	-9°24.4	-12.2	59.1
2	210°13.9	11°22.3	20°42.9	9.7	-9°36.6	-12.1	59.1
3	225°14.0	11°23.1	35°11.6	9.7	-9°48.7	-12.1	59.1
4	240°14.2	11°24.0	49°40.3	9.7	-10°00.7	-12.0	59.1
5	255°14.3	11°24.9	64°08.9	9.6	-10°12.6	-11.9	59.0
6	270°14.4	11°25.7	78°37.5	9.6	-10°24.5	-11.8	59.0
7	285°14.6	11°26.6	93°06.2	9.6	-10°36.3	-11.8	59.0
8	300°14.7	11°27.4	107°34.8	9.6	-10°48.1	-11.7	58.9
9	315°14.8	11°28.3	122°03.4	9.6	-10°59.7	-11.6	58.9
10	330°15.0	11°29.2	136°32.0	9.6	-11°11.3	-11.6	58.9
11	345°15.1	11°30.0	151°00.6	9.6	-11°22.9	-11.5	58.9
12	0°15.2	11°30.9	165°29.2	9.6	-11°34.3	-11.4	58.8
13	15°15.4	11°31.7	179°57.7	9.6	-11°45.7	-11.3	58.8
14	30°15.5	11°32.6	194°26.3	9.5	-11°56.9	-11.2	58.8
15	45°15.6	11°33.4	208°54.8	9.5	-12°08.2	-11.2	58.7
16	60°15.8	11°34.3	223°23.3	9.5	-12°19.3	-11.1	58.7
17	75°15.9	11°35.2	237°51.9	9.5	-12°30.3	-11.0	58.7
18	90°16.0	11°36.0	252°20.4	9.5	-12°41.3	-10.9	58.7
19	105°16.1	11°36.9	266°48.9	9.5	-12°52.2	-10.8	58.6
20	120°16.3	11°37.7	281°17.4	9.5	-13°03.0	-10.8	58.6
21	135°16.4	11°38.6	295°45.8	9.5	-13°13.7	-10.7	58.6
22	150°16.5	11°39.4	310°14.3	9.5	-13°24.3	-10.6	58.5
23	165°16.7	11°40.3	324°42.8	9.4	-13°34.8	-10.5	58.5
	SD.=15.9	d=0.9			S.D.=16.1		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°16.8	11°41.1	339°11.2	9.4	-13°45.3	-10.4	58.5
1	195°16.9	11°42.0	353°39.6	9.4	-13°55.7	-10.3	58.4
2	210°17.1	11°42.8	8°08.0	9.4	-14°05.9	-10.2	58.4
3	225°17.2	11°43.7	22°36.5	9.4	-14°16.1	-10.1	58.4
4	240°17.3	11°44.5	37°04.9	9.4	-14°26.2	-10.0	58.3
5	255°17.4	11°45.4	51°33.2	9.4	-14°36.2	-9.9	58.3
6	270°17.6	11°46.2	66°01.6	9.4	-14°46.1	-9.9	58.3
7	285°17.7	11°47.1	80°30.0	9.4	-14°55.9	-9.8	58.2
8	300°17.8	11°47.9	94°58.3	9.3	-15°05.6	-9.7	58.2
9	315°18.0	11°48.8	109°26.7	9.3	-15°15.2	-9.6	58.2
10	330°18.1	11°49.6	123°55.0	9.3	-15°24.7	-9.5	58.1
11	345°18.2	11°50.5	138°23.3	9.3	-15°34.1	-9.4	58.1
12	0°18.3	11°51.3	152°51.6	9.3	-15°43.5	-9.3	58.1
13	15°18.5	11°52.2	167°19.9	9.3	-15°52.7	-9.2	58.0
14	30°18.6	11°53.0	181°48.2	9.3	-16°01.8	-9.1	58.0
15	45°18.7	11°53.9	196°16.5	9.3	-16°10.8	-9.0	58.0
16	60°18.9	11°54.7	210°44.7	9.3	-16°19.8	-8.9	57.9
17	75°19.0	11°55.6	225°13.0	9.3	-16°28.6	-8.8	57.9
18	90°19.1	11°56.4	239°41.2	9.2	-16°37.3	-8.7	57.9
19	105°19.2	11°57.3	254°09.5	9.2	-16°45.9	-8.6	57.8
20	120°19.4	11°58.1	268°37.7	9.2	-16°54.4	-8.5	57.8
21	135°19.5	11°59.0	283°05.9	9.2	-17°02.8	-8.3	57.8
22	150°19.6	11°59.8	297°34.1	9.2	-17°11.1	-8.2	57.7
23	165°19.7	12°00.7	312°02.3	9.2	-17°19.3	-8.1	57.7
	SD.=15.9	d=0.9			S.D.=15.9		

Lat.	**Twilight**					**Twilight**
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	01:02	03:11	20:51	23:14	–:–
70	–:–	01:60	03:32	20:29	22:05	–:–
68	–:–	02:33	03:49	20:12	21:30	–:–
66	00:53	02:57	04:02	19:59	21:05	23:21
64	01:45	03:15	04:13	19:47	20:46	22:19
62	02:15	03:30	04:22	19:38	20:31	21:47
60	02:37	03:42	04:30	19:30	20:18	21:25
58	02:54	03:53	04:37	19:23	20:07	21:07
56	03:08	04:02	04:43	19:16	19:58	20:52
54	03:20	04:10	04:49	19:11	19:50	20:39
52	03:31	04:17	04:53	19:06	19:42	20:29
50	03:40	04:23	04:58	19:01	19:36	20:19
45	03:59	04:36	05:08	18:51	19:22	20:00
40	04:13	04:47	05:16	18:43	19:12	19:46
35	04:25	04:56	05:22	18:36	19:03	19:34
30	04:34	05:04	05:28	18:30	18:55	19:24
20	04:49	05:16	05:39	18:20	18:42	19:09
10	05:01	05:26	05:47	18:11	18:32	18:57
0	05:10	05:35	05:56	18:02	18:23	18:48
-10	05:18	05:42	06:04	17:54	18:15	18:40
-20	05:24	05:50	06:12	17:45	18:08	18:34
-30	05:30	05:58	06:22	17:36	17:60	18:28
-35	05:32	06:02	06:27	17:30	17:56	18:25
-40	05:34	06:06	06:34	17:24	17:51	18:23
-45	05:37	06:11	06:41	17:16	17:46	18:21
-50	05:39	06:16	06:49	17:08	17:41	18:19
-52	05:39	06:19	06:53	17:04	17:38	18:18
-54	05:40	06:21	06:58	16:59	17:36	18:17
-56	05:41	06:24	07:03	16:55	17:33	18:16
-58	05:41	06:27	07:08	16:49	17:30	18:15
-60	05:42	06:31	07:14	16:43	17:26	18:15

Lat.	**Moonrise**			**Moonset**		
	Fri	Sat	Sun	Fri	Sat	Sun
72	20:16	22:34	–:–	04:47	04:27	03:59
70	20:02	22:05	–:–	04:54	04:43	04:29
68	19:51	21:44	23:39	05:00	04:56	04:51
66	19:42	21:28	23:12	05:05	05:06	05:09
64	19:35	21:15	22:52	05:09	05:15	05:23
62	19:28	21:03	22:35	05:13	05:23	05:35
60	19:23	20:54	22:22	05:16	05:30	05:46
58	19:18	20:46	22:10	05:19	05:36	05:55
56	19:14	20:38	21:60	05:22	05:41	06:03
54	19:10	20:32	21:51	05:24	05:46	06:10
52	19:06	20:26	21:43	05:26	05:50	06:16
50	19:03	20:21	21:36	05:28	05:54	06:22
45	18:56	20:10	21:21	05:32	06:02	06:35
40	18:51	20:01	21:08	05:36	06:09	06:45
35	18:46	19:53	20:58	05:39	06:16	06:54
30	18:41	19:46	20:49	05:42	06:21	07:02
20	18:34	19:34	20:33	05:47	06:30	07:16
10	18:28	19:23	20:19	05:51	06:39	07:28
0	18:22	19:14	20:06	05:55	06:47	07:39
-10	18:16	19:04	19:54	05:59	06:54	07:50
-20	18:10	18:54	19:40	06:03	07:03	08:02
-30	18:03	18:43	19:25	06:08	07:12	08:16
-35	17:59	18:36	19:16	06:10	07:18	08:24
-40	17:54	18:29	19:06	06:13	07:24	08:33
-45	17:49	18:20	18:54	06:17	07:31	08:44
-50	17:43	18:10	18:40	06:21	07:40	08:57
-52	17:40	18:05	18:33	06:23	07:44	09:03
-54	17:37	17:59	18:26	06:26	07:49	09:10
-56	17:33	17:54	18:18	06:28	07:54	09:17
-58	17:30	17:47	18:08	06:31	07:60	09:26
-60	17:25	17:40	17:58	06:34	08:06	09:36

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	00:41	00:48	11:59	00:34	12:08	14(100%)
20	00:55	01:01	11:58	00:34	13:00	15(98%)
21	01:07	01:13	11:58	01:26	13:52	16(95%)

April 22, 23 ,24 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	209°45.8	207°40.5	-0°47.0	136°55.0	23°32.6	306°06.2	-22°40.4	277°41.6	-21°29.1
1	224°48.2	222°40.1	-0°45.8	151°55.7	23°32.8	321°08.7	-22°40.4	292°44.0	-21°29.1
2	239°50.7	237°39.8	-0°44.6	166°56.4	23°33.0	336°11.3	-22°40.4	307°46.4	-21°29.1
3	254°53.2	252°39.5	-0°43.5	181°57.1	23°33.2	351°13.8	-22°40.4	322°48.8	-21°29.1
4	269°55.6	267°39.1	-0°42.3	196°57.7	23°33.4	6°16.4	-22°40.4	337°51.3	-21°29.0
5	284°58.1	282°38.8	-0°41.1	211°58.4	23°33.6	21°19.0	-22°40.4	352°53.7	-21°29.0
6	300°00.6	297°38.5	-0°40.0	226°59.1	23°33.8	36°21.5	-22°40.4	7°56.1	-21°29.0
7	315°03.0	312°38.1	-0°38.8	241°59.8	23°34.0	51°24.1	-22°40.4	22°58.6	-21°29.0
8	330°05.5	327°37.8	-0°37.7	257°00.5	23°34.2	66°26.6	-22°40.4	38°01.0	-21°29.0
9	345°08.0	342°37.5	-0°36.5	272°01.2	23°34.4	81°29.2	-22°40.4	53°03.4	-21°29.0
10	0°10.4	357°37.2	-0°35.3	287°01.9	23°34.6	96°31.8	-22°40.4	68°05.9	-21°29.0
11	15°12.9	12°36.8	-0°34.2	302°02.6	23°34.8	111°34.3	-22°40.4	83°08.3	-21°29.0
12	30°15.3	27°36.5	-0°33.0	317°03.3	23°35.0	126°36.9	-22°40.4	98°10.7	-21°29.0
13	45°17.8	42°36.2	-0°31.8	332°04.0	23°35.2	141°39.5	-22°40.3	113°13.1	-21°29.0
14	60°20.3	57°35.8	-0°30.7	347°04.7	23°35.4	156°42.0	-22°40.3	128°15.6	-21°29.0
15	75°22.7	72°35.5	-0°29.5	2°05.4	23°35.6	171°44.6	-22°40.3	143°18.0	-21°29.0
16	90°25.2	87°35.2	-0°28.3	17°06.1	23°35.8	186°47.1	-22°40.3	158°20.4	-21°29.0
17	105°27.7	102°34.8	-0°27.2	32°06.8	23°36.0	201°49.7	-22°40.3	173°22.9	-21°29.0
18	120°30.1	117°34.5	-0°26.0	47°07.5	23°36.2	216°52.3	-22°40.3	188°25.3	-21°29.0
19	135°32.6	132°34.2	-0°24.8	62°08.2	23°36.4	231°54.8	-22°40.3	203°27.7	-21°29.0
20	150°35.1	147°33.9	-0°23.7	77°08.8	23°36.6	246°57.4	-22°40.3	218°30.2	-21°29.0
21	165°37.5	162°33.5	-0°22.5	92°09.5	23°36.8	261°60.0	-22°40.3	233°32.6	-21°29.0
22	180°40.0	177°33.2	-0°21.3	107°10.2	23°37.0	277°02.5	-22°40.3	248°35.0	-21°29.0
23	195°42.5	192°32.9	-0°20.2	122°10.9	23°37.1	292°05.1	-22°40.3	263°37.5	-21°29.0
Mer.pass.:9:59:		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	210°44.9	207°32.5	-0°19.0	137°11.6	23°37.3	307°07.7	-22°40.3	278°39.9	-21°29.0
1	225°47.4	222°32.2	-0°17.9	152°12.3	23°37.5	322°10.2	-22°40.3	293°42.3	-21°29.0
2	240°49.8	237°31.9	-0°16.7	167°13.0	23°37.7	337°12.8	-22°40.3	308°44.8	-21°29.0
3	255°52.3	252°31.5	-0°15.5	182°13.7	23°37.9	352°15.4	-22°40.3	323°47.2	-21°29.0
4	270°54.8	267°31.2	-0°14.4	197°14.4	23°38.1	7°17.9	-22°40.3	338°49.6	-21°29.0
5	285°57.2	282°30.9	-0°13.2	212°15.1	23°38.3	22°20.5	-22°40.3	353°52.1	-21°29.0
6	300°59.7	297°30.6	-0°12.0	227°15.8	23°38.5	37°23.1	-22°40.3	8°54.5	-21°29.0
7	316°02.2	312°30.2	-0°10.9	242°16.5	23°38.7	52°25.6	-22°40.3	23°56.9	-21°29.0
8	331°04.6	327°29.9	-0°09.7	257°17.2	23°38.9	67°28.2	-22°40.3	38°59.4	-21°29.0
9	346°07.1	342°29.6	-0°08.5	272°17.9	23°39.1	82°30.8	-22°40.3	54°01.8	-21°29.0
10	1°09.6	357°29.2	-0°07.4	287°18.6	23°39.3	97°33.4	-22°40.3	69°04.2	-21°29.0
11	16°12.0	12°28.9	-0°06.2	302°19.2	23°39.5	112°35.9	-22°40.3	84°06.7	-21°29.0
12	31°14.5	27°28.6	-0°05.0	317°19.9	23°39.7	127°38.5	-22°40.3	99°09.1	-21°29.0
13	46°17.0	42°28.3	-0°03.9	332°20.6	23°39.9	142°41.1	-22°40.3	114°11.5	-21°29.0
14	61°19.4	57°27.9	-0°02.7	347°21.3	23°40.0	157°43.6	-22°40.3	129°14.0	-21°29.0
15	76°21.9	72°27.6	-0°01.5	2°22.0	23°40.2	172°46.2	-22°40.3	144°16.4	-21°29.0
16	91°24.3	87°27.3	-0°00.4	17°22.7	23°40.4	187°48.8	-22°40.2	159°18.9	-21°29.0
17	106°26.8	102°26.9	0°00.8	32°23.4	23°40.6	202°51.4	-22°40.2	174°21.3	-21°28.9
18	121°29.3	117°26.6	0°02.0	47°24.1	23°40.8	217°53.9	-22°40.2	189°23.7	-21°28.9
19	136°31.7	132°26.3	0°03.1	62°24.8	23°41.0	232°56.5	-22°40.2	204°26.2	-21°28.9
20	151°34.2	147°25.9	0°04.3	77°25.5	23°41.2	247°59.1	-22°40.2	219°28.6	-21°28.9
21	166°36.7	162°25.6	0°05.5	92°26.2	23°41.4	263°01.6	-22°40.2	234°31.0	-21°28.9
22	181°39.1	177°25.3	0°06.6	107°26.9	23°41.6	278°04.2	-22°40.2	249°33.5	-21°28.9
23	196°41.6	192°25.0	0°07.8	122°27.6	23°41.7	293°06.8	-22°40.2	264°35.9	-21°28.9
Mer.pass.:9:55:		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.2		v2.4 d0.0 m0.5	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	211°44.1	207°24.6	0°09.0	137°28.3	23°41.9	308°09.4	-22°40.2	279°38.3	-21°28.9
1	226°46.5	222°24.3	0°10.1	152°28.9	23°42.1	323°11.9	-22°40.2	294°40.8	-21°28.9
2	241°49.0	237°24.0	0°11.3	167°29.6	23°42.3	338°14.5	-22°40.2	309°43.2	-21°28.9
3	256°51.5	252°23.6	0°12.5	182°30.3	23°42.5	353°17.1	-22°40.2	324°45.7	-21°28.9
4	271°53.9	267°23.3	0°13.6	197°31.0	23°42.7	8°19.7	-22°40.2	339°48.1	-21°28.9
5	286°56.4	282°23.0	0°14.8	212°31.7	23°42.9	23°22.3	-22°40.2	354°50.5	-21°28.9
6	301°58.8	297°22.7	0°16.0	227°32.4	23°43.0	38°24.8	-22°40.2	9°53.0	-21°28.9
7	317°01.3	312°22.3	0°17.1	242°33.1	23°43.2	53°27.4	-22°40.2	24°55.4	-21°28.9
8	332°03.8	327°22.0	0°18.3	257°33.8	23°43.4	68°30.0	-22°40.2	39°57.9	-21°28.9
9	347°06.2	342°21.7	0°19.5	272°34.5	23°43.6	83°32.6	-22°40.2	55°00.3	-21°28.9
10	2°08.7	357°21.3	0°20.6	287°35.2	23°43.8	98°35.1	-22°40.2	70°02.7	-21°28.9
11	17°11.2	12°21.0	0°21.8	302°35.9	23°44.0	113°37.7	-22°40.2	85°05.2	-21°28.9
12	32°13.6	27°20.7	0°23.0	317°36.6	23°44.1	128°40.3	-22°40.2	100°07.6	-21°28.9
13	47°16.1	42°20.3	0°24.1	332°37.2	23°44.3	143°42.9	-22°40.2	115°10.1	-21°28.9
14	62°18.6	57°20.0	0°25.3	347°37.9	23°44.5	158°45.5	-22°40.2	130°12.5	-21°28.9
15	77°21.0	72°19.7	0°26.5	2°38.6	23°44.7	173°48.0	-22°40.2	145°14.9	-21°28.9
16	92°23.5	87°19.4	0°27.7	17°39.3	23°44.9	188°50.6	-22°40.1	160°17.4	-21°28.9
17	107°25.9	102°19.0	0°28.8	32°40.0	23°45.1	203°53.2	-22°40.1	175°19.8	-21°28.9
18	122°28.4	117°18.7	0°30.0	47°40.7	23°45.2	218°55.8	-22°40.1	190°22.3	-21°28.9
19	137°30.9	132°18.4	0°31.2	62°41.4	23°45.4	233°58.4	-22°40.1	205°24.7	-21°28.9
20	152°33.3	147°18.0	0°32.3	77°42.1	23°45.6	249°00.9	-22°40.1	220°27.1	-21°28.9
21	167°35.8	162°17.7	0°33.5	92°42.8	23°45.8	264°03.5	-22°40.1	235°29.6	-21°28.9
22	182°38.3	177°17.4	0°34.7	107°43.5	23°46.0	279°06.1	-22°40.1	250°32.0	-21°28.9
23	197°40.7	192°17.0	0°35.8	122°44.2	23°46.1	294°08.7	-22°40.1	265°34.5	-21°28.9
Mer.pass.:9:51:		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.3		v2.4 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.2	-42°12.2
Schedar	349°36.5	56°38.3
Diphda	348°52.1	-17°53.1
Achernar	335°24.4	-57°08.5
Hamal	327°56.7	23°33.0
Polaris	316°30.0	89°20.7
Akamar	315°15.7	-40°13.9
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.6	-52°42.8
Sirius	258°30.3	-16°44.7
Adara	255°09.5	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.4	-59°34.6
Suhail	222°49.4	-43°30.9
Miaplacidus	221°38.7	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.1	11°52.3
Dubhe	193°46.4	61°39.0
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.2	-63°12.4
Gacrux	171°55.9	-57°13.3
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.6	-60°27.9
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.7	-60°54.7
Zubenelg.	137°00.7	-16°07.2
Kochab	137°18.9	74°04.6
Alphecca	126°07.3	26°39.0
Antares	112°21.1	-26°28.3
Atria	107°18.9	-69°03.4
Sabik	102°07.7	-15°44.8
Shaula	96°16.3	-37°06.8
Rasalhague	96°02.6	12°32.8
Etamin	90°44.0	51°29.0
Kaus Aust.	83°38.4	-34°22.3
Vega	80°36.1	38°47.9
Nunki	75°53.3	-26°16.2
Altair	62°04.4	8°55.0
Peacock	53°13.0	-56°40.1
Deneb	49°28.8	45°20.7
Enif	33°43.4	9°57.6
Alnair	27°39.0	-46°51.9
Fomalhaut	15°19.9	-29°31.2
Scheat	13°49.8	28°10.9
Markab	13°34.6	15°18.3

2019/4/2	**SHA**	**Mer.pass**
Venus	357°54.7	10:10
Mars	287°09.2	14:52
Jupiter	96°20.4	03:35
Saturn	67°55.8	05:28

2019/4/2	**SHA**	**Mer.pass**
Venus	356°47.6	10:10
Mars	286°26.7	14:51
Jupiter	96°22.7	03:31
Saturn	67°55.0	05:24

2019/4/2	**SHA**	**Mer.pass**
Venus	355°40.6	10:11
Mars	285°44.2	14:49
Jupiter	96°25.3	03:27
Saturn	67°54.3	05:21

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°19.9	12°01.5	326°30.5	9.2	-17°27.4	-8.0	57.7
1	195°20.0	12°02.3	340°58.7	9.2	-17°35.3	-7.9	57.6
2	210°20.1	12°03.2	355°26.9	9.2	-17°43.2	-7.8	57.6
3	225°20.2	12°04.0	9°55.1	9.2	-17°51.0	-7.7	57.6
4	240°20.4	12°04.9	24°23.3	9.2	-17°58.6	-7.6	57.5
5	255°20.5	12°05.7	38°51.4	9.2	-18°06.1	-7.5	57.5
6	270°20.6	12°06.6	53°19.6	9.2	-18°13.6	-7.4	57.5
7	285°20.7	12°07.4	67°47.7	9.2	-18°20.9	-7.3	57.4
8	300°20.9	12°08.2	82°15.9	9.1	-18°28.1	-7.2	57.4
9	315°21.0	12°09.1	96°44.0	9.1	-18°35.2	-7.0	57.4
10	330°21.1	12°09.9	111°12.2	9.1	-18°42.2	-6.9	57.3
11	345°21.2	12°10.8	125°40.3	9.1	-18°49.0	-6.8	57.3
12	0°21.4	12°11.6	140°08.4	9.1	-18°55.8	-6.7	57.3
13	15°21.5	12°12.4	154°36.6	9.1	-19°02.4	-6.6	57.2
14	30°21.6	12°13.3	169°04.7	9.1	-19°09.0	-6.5	57.2
15	45°21.7	12°14.1	183°32.8	9.1	-19°15.4	-6.4	57.2
16	60°21.8	12°15.0	198°01.0	9.1	-19°21.7	-6.2	57.1
17	75°22.0	12°15.8	212°29.1	9.1	-19°27.9	-6.1	57.1
18	90°22.1	12°16.6	226°57.2	9.1	-19°33.9	-6.0	57.0
19	105°22.2	12°17.5	241°25.4	9.1	-19°39.9	-5.9	57.0
20	120°22.3	12°18.3	255°53.5	9.1	-19°45.7	-5.8	57.0
21	135°22.4	12°19.2	270°21.6	9.1	-19°51.5	-5.7	56.9
22	150°22.6	12°20.0	284°49.8	9.1	-19°57.1	-5.5	56.9
23	165°22.7	12°20.8	299°17.9	9.1	-20°02.6	-5.4	56.9
	SD.=15.9	d=0.8			S.D.=15.7		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°22.8	12°21.7	313°46.1	9.1	-20°07.9	-5.3	56.8
1	195°22.9	12°22.5	328°14.2	9.2	-20°13.2	-5.2	56.8
2	210°23.1	12°23.3	342°42.4	9.2	-20°18.3	-5.1	56.8
3	225°23.2	12°24.2	357°10.5	9.2	-20°23.3	-5.0	56.7
4	240°23.3	12°25.0	11°38.7	9.2	-20°28.3	-4.8	56.7
5	255°23.4	12°25.8	26°06.9	9.2	-20°33.0	-4.7	56.7
6	270°23.5	12°26.7	40°35.1	9.2	-20°37.7	-4.6	56.6
7	285°23.7	12°27.5	55°03.3	9.2	-20°42.3	-4.5	56.6
8	300°23.8	12°28.3	69°31.5	9.2	-20°46.7	-4.4	56.6
9	315°23.9	12°29.2	83°59.7	9.2	-20°51.0	-4.3	56.5
10	330°24.0	12°30.0	98°27.9	9.2	-20°55.2	-4.1	56.5
11	345°24.1	12°30.8	112°56.1	9.2	-20°59.3	-4.0	56.5
12	0°24.2	12°31.7	127°24.4	9.2	-21°03.2	-3.9	56.4
13	15°24.4	12°32.5	141°52.6	9.3	-21°07.1	-3.8	56.4
14	30°24.5	12°33.3	156°20.9	9.3	-21°10.8	-3.7	56.4
15	45°24.6	12°34.2	170°49.2	9.3	-21°14.4	-3.5	56.4
16	60°24.7	12°35.0	185°17.4	9.3	-21°17.9	-3.4	56.3
17	75°24.8	12°35.8	199°45.8	9.3	-21°21.2	-3.3	56.3
18	90°24.9	12°36.7	214°14.1	9.3	-21°24.5	-3.2	56.3
19	105°25.1	12°37.5	228°42.4	9.3	-21°27.6	-3.1	56.2
20	120°25.2	12°38.3	243°10.8	9.4	-21°30.6	-2.9	56.2
21	135°25.3	12°39.2	257°39.2	9.4	-21°33.5	-2.8	56.2
22	150°25.4	12°40.0	272°07.5	9.4	-21°36.3	-2.7	56.1
23	165°25.5	12°40.8	286°36.0	9.4	-21°38.9	-2.6	56.1
	SD.=15.9	d=0.8			S.D.=15.5		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°25.6	12°41.6	301°04.4	9.4	-21°41.5	-2.5	56.1
1	195°25.8	12°42.5	315°32.8	9.5	-21°43.9	-2.4	56.0
2	210°25.9	12°43.3	330°01.3	9.5	-21°46.2	-2.2	56.0
3	225°26.0	12°44.1	344°29.8	9.5	-21°48.4	-2.1	56.0
4	240°26.1	12°44.9	358°58.3	9.5	-21°50.4	-2.0	55.9
5	255°26.2	12°45.8	13°26.9	9.6	-21°52.4	-1.9	55.9
6	270°26.3	12°46.6	27°55.4	9.6	-21°54.2	-1.8	55.9
7	285°26.4	12°47.4	42°24.0	9.6	-21°55.9	-1.7	55.9
8	300°26.6	12°48.2	56°52.6	9.6	-21°57.5	-1.5	55.8
9	315°26.7	12°49.1	71°21.3	9.7	-21°59.0	-1.4	55.8
10	330°26.8	12°49.9	85°49.9	9.7	-22°00.3	-1.3	55.8
11	345°26.9	12°50.7	100°18.6	9.7	-22°01.6	-1.2	55.7
12	0°27.0	12°51.5	114°47.3	9.7	-22°02.7	-1.1	55.7
13	15°27.1	12°52.4	129°16.1	9.8	-22°03.7	-1.0	55.7
14	30°27.2	12°53.2	143°44.9	9.8	-22°04.6	-0.8	55.7
15	45°27.4	12°54.0	158°13.7	9.8	-22°05.4	-0.7	55.6
16	60°27.5	12°54.8	172°42.5	9.9	-22°06.0	-0.6	55.6
17	75°27.6	12°55.7	187°11.4	9.9	-22°06.6	-0.5	55.6
18	90°27.7	12°56.5	201°40.3	9.9	-22°07.0	-0.4	55.5
19	105°27.8	12°57.3	216°09.2	9.9	-22°07.3	-0.3	55.5
20	120°27.9	12°58.1	230°38.2	10.0	-22°07.5	-0.1	55.5
21	135°28.0	12°58.9	245°07.2	10.0	-22°07.6	-0.0	55.5
22	150°28.1	12°59.8	259°36.2	10.0	-22°07.6	0.1	55.4
23	165°28.2	13°00.6	274°05.2	10.1	-22°07.5	0.2	55.4
	SD.=15.9	d=0.8			S.D.=15.3		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:53	21:09	–:–	–:–
70	–:–	01:33	03:17	20:44	22:33	–:–
68	–:–	02:14	03:35	20:24	21:48	–:–
66	–:–	02:42	03:50	20:09	21:19	–:–
64	01:21	03:02	04:02	19:57	20:57	22:43
62	01:58	03:19	04:13	19:46	20:41	22:03
60	02:24	03:32	04:21	19:37	20:27	21:37
58	02:43	03:44	04:29	19:29	20:15	21:17
56	02:59	03:54	04:36	19:22	20:05	21:00
54	03:12	04:02	04:42	19:16	19:56	20:47
52	03:23	04:10	04:47	19:11	19:48	20:35
50	03:33	04:17	04:52	19:06	19:41	20:25
45	03:53	04:31	05:03	18:55	19:27	20:05
40	04:08	04:43	05:11	18:46	19:15	19:49
35	04:21	04:52	05:19	18:39	19:05	19:37
30	04:31	05:00	05:25	18:32	18:57	19:27
20	04:47	05:14	05:36	18:21	18:43	19:10
10	04:59	05:25	05:46	18:11	18:32	18:58
0	05:09	05:34	05:55	18:02	18:23	18:48
-10	05:18	05:42	06:04	17:53	18:14	18:39
-20	05:25	05:51	06:13	17:43	18:06	18:32
-30	05:31	05:59	06:24	17:33	17:57	18:25
-35	05:34	06:04	06:30	17:27	17:52	18:22
-40	05:37	06:09	06:37	17:20	17:47	18:19
-45	05:40	06:14	06:45	17:12	17:42	18:16
-50	05:43	06:21	06:54	17:02	17:35	18:13
-52	05:44	06:23	06:58	16:58	17:33	18:12
-54	05:45	06:26	07:03	16:53	17:29	18:11
-56	05:46	06:30	07:09	16:47	17:26	18:10
-58	05:47	06:33	07:14	16:41	17:23	18:08
-60	05:48	06:37	07:21	16:35	17:18	18:07

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	01:43	–:–	–:–	02:40	–:–	–:–
70	00:18	–:–	–:–	04:07	–:–	–:–
68	–:–	01:36	03:46	04:46	04:40	04:19
66	–:–	00:52	02:19	05:14	05:24	05:47
64	–:–	00:23	01:41	05:35	05:54	06:25
62	–:–	00:01	01:14	05:52	06:16	06:52
60	23:43	–:–	00:53	06:06	06:34	07:13
58	23:28	–:–	00:37	06:19	06:49	07:30
56	23:16	–:–	00:22	06:29	07:02	07:44
54	23:05	–:–	00:10	06:39	07:14	07:57
52	22:55	23:59	–:–	06:47	07:24	08:08
50	22:46	23:49	–:–	06:55	07:33	08:17
45	22:28	23:29	–:–	07:11	07:52	08:38
40	22:13	23:13	–:–	07:24	08:07	08:55
35	22:00	22:59	23:52	07:35	08:20	09:09
30	21:49	22:47	23:40	07:45	08:32	09:21
20	21:30	22:26	23:19	08:03	08:51	09:42
10	21:14	22:08	23:01	08:17	09:08	09:60
0	20:59	21:52	22:44	08:32	09:24	10:17
-10	20:44	21:35	22:27	08:46	09:40	10:34
-20	20:28	21:17	22:08	09:01	09:57	10:52
-30	20:09	20:57	21:47	09:18	10:17	11:13
-35	19:59	20:45	21:35	09:28	10:29	11:25
-40	19:47	20:32	21:21	09:40	10:42	11:39
-45	19:32	20:16	21:04	09:53	10:58	11:56
-50	19:15	19:56	20:44	10:10	11:17	12:16
-52	19:07	19:47	20:34	10:18	11:26	12:26
-54	18:57	19:36	20:23	10:27	11:36	12:37
-56	18:47	19:24	20:11	10:36	11:48	12:49
-58	18:35	19:11	19:56	10:48	12:01	13:04
-60	18:22	18:55	19:39	11:01	12:17	13:21

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	01:19	01:25	11:58	02:18	14:45	17(89%)
23	01:31	01:37	11:58	03:11	15:38	18(81%)
24	01:43	01:48	11:58	04:04	16:30	19(73%)

April 25, 26 ,27 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	212°43.2	207°16.7	0°37.0	137°44.9	23°46.3	309°11.3	-22°40.1	280°36.9	-21°28.9
1	227°45.7	222°16.4	0°38.2	152°45.5	23°46.5	324°13.9	-22°40.1	295°39.3	-21°28.9
2	242°48.1	237°16.1	0°39.3	167°46.2	23°46.7	339°16.4	-22°40.1	310°41.8	-21°28.9
3	257°50.6	252°15.7	0°40.5	182°46.9	23°46.9	354°19.0	-22°40.1	325°44.2	-21°28.9
4	272°53.1	267°15.4	0°41.7	197°47.6	23°47.0	9°21.6	-22°40.1	340°46.7	-21°28.9
5	287°55.5	282°15.1	0°42.8	212°48.3	23°47.2	24°24.2	-22°40.1	355°49.1	-21°28.9
6	302°58.0	297°14.7	0°44.0	227°49.0	23°47.4	39°26.8	-22°40.1	10°51.6	-21°28.9
7	318°00.4	312°14.4	0°45.2	242°49.7	23°47.6	54°29.4	-22°40.1	25°54.0	-21°28.9
8	333°02.9	327°14.1	0°46.3	257°50.4	23°47.7	69°31.9	-22°40.1	40°56.4	-21°28.9
9	348°05.4	342°13.8	0°47.5	272°51.1	23°47.9	84°34.5	-22°40.1	55°58.9	-21°28.9
10	3°07.8	357°13.4	0°48.7	287°51.8	23°48.1	99°37.1	-22°40.1	71°01.3	-21°28.9
11	18°10.3	12°13.1	0°49.8	302°52.5	23°48.3	114°39.7	-22°40.1	86°03.8	-21°28.9
12	33°12.8	27°12.8	0°51.0	317°53.1	23°48.4	129°42.3	-22°40.1	101°06.2	-21°28.9
13	48°15.2	42°12.4	0°52.2	332°53.8	23°48.6	144°44.9	-22°40.1	116°08.7	-21°28.9
14	63°17.7	57°12.1	0°53.4	347°54.5	23°48.8	159°47.5	-22°40.1	131°11.1	-21°28.9
15	78°20.2	72°11.8	0°54.5	2°55.2	23°49.0	174°50.1	-22°40.0	146°13.5	-21°28.9
16	93°22.6	87°11.4	0°55.7	17°55.9	23°49.1	189°52.6	-22°40.0	161°16.0	-21°28.9
17	108°25.1	102°11.1	0°56.9	32°56.6	23°49.3	204°55.2	-22°40.0	176°18.4	-21°28.9
18	123°27.6	117°10.8	0°58.0	47°57.3	23°49.5	219°57.8	-22°40.0	191°20.9	-21°28.9
19	138°30.0	132°10.4	0°59.2	62°58.0	23°49.7	235°00.4	-22°40.0	206°23.3	-21°28.9
20	153°32.5	147°10.1	1°00.4	77°58.7	23°49.8	250°03.0	-22°40.0	221°25.8	-21°28.9
21	168°34.9	162°09.8	1°01.5	92°59.4	23°50.0	265°05.6	-22°40.0	236°28.2	-21°28.9
22	183°37.4	177°09.5	1°02.7	108°00.0	23°50.2	280°08.2	-22°40.0	251°30.7	-21°28.9
23	198°39.9	192°09.1	1°03.9	123°00.7	23°50.4	295°10.8	-22°40.0	266°33.1	-21°28.9
Mer.pass.:9:47:		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.3		v2.4 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	213°42.3	207°08.8	1°05.0	138°01.4	23°50.5	310°13.4	-22°40.0	281°35.6	-21°28.9
1	228°44.8	222°08.5	1°06.2	153°02.1	23°50.7	325°16.0	-22°40.0	296°38.0	-21°28.9
2	243°47.3	237°08.1	1°07.4	168°02.8	23°50.9	340°18.5	-22°40.0	311°40.4	-21°28.9
3	258°49.7	252°07.8	1°08.5	183°03.5	23°51.0	355°21.1	-22°40.0	326°42.9	-21°28.9
4	273°52.2	267°07.5	1°09.7	198°04.2	23°51.2	10°23.7	-22°40.0	341°45.3	-21°28.9
5	288°54.7	282°07.1	1°10.9	213°04.9	23°51.4	25°26.3	-22°40.0	356°47.8	-21°28.9
6	303°57.1	297°06.8	1°12.1	228°05.6	23°51.5	40°28.9	-22°40.0	11°50.2	-21°28.9
7	318°59.6	312°06.5	1°13.2	243°06.3	23°51.7	55°31.5	-22°40.0	26°52.7	-21°28.9
8	334°02.1	327°06.2	1°14.4	258°06.9	23°51.9	70°34.1	-22°40.0	41°55.1	-21°28.9
9	349°04.5	342°05.8	1°15.6	273°07.6	23°52.0	85°36.7	-22°40.0	56°57.6	-21°28.9
10	4°07.0	357°05.5	1°16.7	288°08.3	23°52.2	100°39.3	-22°40.0	72°00.0	-21°28.9
11	19°09.4	12°05.2	1°17.9	303°09.0	23°52.4	115°41.9	-22°40.0	87°02.5	-21°28.9
12	34°11.9	27°04.8	1°19.1	318°09.7	23°52.6	130°44.5	-22°39.9	102°04.9	-21°28.9
13	49°14.4	42°04.5	1°20.2	333°10.4	23°52.7	145°47.1	-22°39.9	117°07.4	-21°28.9
14	64°16.8	57°04.2	1°21.4	348°11.1	23°52.9	160°49.7	-22°39.9	132°09.8	-21°28.9
15	79°19.3	72°03.8	1°22.6	3°11.8	23°53.1	175°52.3	-22°39.9	147°12.3	-21°28.9
16	94°21.8	87°03.5	1°23.7	18°12.5	23°53.2	190°54.9	-22°39.9	162°14.7	-21°28.9
17	109°24.2	102°03.2	1°24.9	33°13.2	23°53.4	205°57.5	-22°39.9	177°17.2	-21°28.9
18	124°26.7	117°02.8	1°26.1	48°13.8	23°53.5	221°00.1	-22°39.9	192°19.6	-21°28.9
19	139°29.2	132°02.5	1°27.3	63°14.5	23°53.7	236°02.7	-22°39.9	207°22.1	-21°28.9
20	154°31.6	147°02.2	1°28.4	78°15.2	23°53.9	251°05.3	-22°39.9	222°24.5	-21°28.9
21	169°34.1	162°01.9	1°29.6	93°15.9	23°54.0	266°07.9	-22°39.9	237°27.0	-21°28.9
22	184°36.5	177°01.5	1°30.8	108°16.6	23°54.2	281°10.5	-22°39.9	252°29.4	-21°28.9
23	199°39.0	192°01.2	1°31.9	123°17.3	23°54.4	296°13.1	-22°39.9	267°31.9	-21°28.9
Mer.pass.:9:43:		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.3		v2.4 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	214°41.5	207°00.9	1°33.1	138°18.0	23°54.5	311°15.7	-22°39.9	282°34.3	-21°28.9
1	229°43.9	222°00.5	1°34.3	153°18.7	23°54.7	326°18.3	-22°39.9	297°36.8	-21°28.9
2	244°46.4	237°00.2	1°35.4	168°19.4	23°54.9	341°20.9	-22°39.9	312°39.2	-21°28.9
3	259°48.9	251°59.9	1°36.6	183°20.1	23°55.0	356°23.5	-22°39.9	327°41.7	-21°28.9
4	274°51.3	266°59.5	1°37.8	198°20.7	23°55.2	11°26.1	-22°39.9	342°44.1	-21°28.9
5	289°53.8	281°59.2	1°38.9	213°21.4	23°55.3	26°28.7	-22°39.9	357°46.6	-21°28.9
6	304°56.3	296°58.9	1°40.1	228°22.1	23°55.5	41°31.3	-22°39.9	12°49.0	-21°28.9
7	319°58.7	311°58.5	1°41.3	243°22.8	23°55.7	56°33.9	-22°39.9	27°51.5	-21°28.9
8	335°01.2	326°58.2	1°42.5	258°23.5	23°55.8	71°36.5	-22°39.8	42°53.9	-21°28.9
9	350°03.7	341°57.9	1°43.6	273°24.2	23°56.0	86°39.1	-22°39.8	57°56.4	-21°28.9
10	5°06.1	356°57.5	1°44.8	288°24.9	23°56.1	101°41.7	-22°39.8	72°58.8	-21°28.9
11	20°08.6	11°57.2	1°46.0	303°25.6	23°56.3	116°44.3	-22°39.8	88°01.3	-21°28.9
12	35°11.0	26°56.9	1°47.1	318°26.3	23°56.5	131°46.9	-22°39.8	103°03.7	-21°28.9
13	50°13.5	41°56.5	1°48.3	333°26.9	23°56.6	146°49.5	-22°39.8	118°06.2	-21°28.9
14	65°16.0	56°56.2	1°49.5	348°27.6	23°56.8	161°52.1	-22°39.8	133°08.6	-21°28.9
15	80°18.4	71°55.9	1°50.6	3°28.3	23°56.9	176°54.7	-22°39.8	148°11.1	-21°28.9
16	95°20.9	86°55.5	1°51.8	18°29.0	23°57.1	191°57.3	-22°39.8	163°13.5	-21°28.9
17	110°23.4	101°55.2	1°53.0	33°29.7	23°57.3	206°59.9	-22°39.8	178°16.0	-21°28.9
18	125°25.8	116°54.9	1°54.1	48°30.4	23°57.4	222°02.5	-22°39.8	193°18.5	-21°28.9
19	140°28.3	131°54.6	1°55.3	63°31.1	23°57.6	237°05.1	-22°39.8	208°20.9	-21°28.9
20	155°30.8	146°54.2	1°56.5	78°31.8	23°57.7	252°07.7	-22°39.8	223°23.4	-21°28.9
21	170°33.2	161°53.9	1°57.7	93°32.4	23°57.9	267°10.3	-22°39.8	238°25.8	-21°28.9
22	185°35.7	176°53.6	1°58.8	108°33.1	23°58.0	282°12.9	-22°39.8	253°28.3	-21°28.9
23	200°38.2	191°53.2	1°60.0	123°33.8	23°58.2	297°15.5	-22°39.8	268°30.7	-21°28.9
Mer.pass.:9:39:		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.3		v2.5 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.1	-42°12.2
Schedar	349°36.5	56°38.3
Diphda	348°52.1	-17°53.0
Achernar	335°24.4	-57°08.5
Hamal	327°56.6	23°33.0
Polaris	316°30.0	89°20.6
Akamar	315°15.7	-40°13.9
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.7	-52°42.8
Sirius	258°30.3	-16°44.7
Adara	255°09.5	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.8	27°58.7
Avior	234°16.4	-59°34.6
Suhail	222°49.4	-43°30.9
Miaplacidus	221°38.7	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.1	11°52.4
Dubhe	193°46.4	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.3	-63°12.4
Gacrux	171°55.9	-57°13.3
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.6	-60°27.9
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.7	-60°54.7
Zubenelg.	137°00.7	-16°07.2
Kochab	137°18.9	74°04.6
Alphecca	126°07.3	26°39.0
Antares	112°21.1	-26°28.3
Atria	107°18.9	-69°03.4
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°06.8
Rasalhague	96°02.6	12°32.8
Etamin	90°44.0	51°29.0
Kaus Aust.	83°38.3	-34°22.3
Vega	80°36.1	38°47.9
Nunki	75°53.3	-26°16.2
Altair	62°04.4	8°55.0
Peacock	53°13.0	-56°40.1
Deneb	49°28.8	45°20.7
Enif	33°43.3	9°57.6
Alnair	27°39.0	-46°51.9
Fomalhaut	15°19.9	-29°31.2
Scheat	13°49.8	28°10.9
Markab	13°34.6	15°18.3

2019/4/2	**SHA**	**Mer.pass**
Venus	354°33.5	10:11
Mars	285°01.7	14:48
Jupiter	96°28.1	03:23
Saturn	67°53.7	05:17

2019/4/2	**SHA**	**Mer.pass**
Venus	353°26.5	10:12
Mars	284°19.1	14:47
Jupiter	96°31.0	03:19
Saturn	67°53.2	05:13

2019/4/2	**SHA**	**Mer.pass**
Venus	352°19.4	10:12
Mars	283°36.5	14:46
Jupiter	96°34.2	03:14
Saturn	67°52.8	05:09

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°28.4	13°01.4	288°34.3	10.1	-22°07.2	0.3	55.4
1	195°28.5	13°02.2	303°03.5	10.2	-22°06.8	0.4	55.4
2	210°28.6	13°03.0	317°32.6	10.2	-22°06.4	0.5	55.3
3	225°28.7	13°03.9	332°01.9	10.2	-22°05.8	0.6	55.3
4	240°28.8	13°04.7	346°31.1	10.3	-22°05.1	0.8	55.3
5	255°28.9	13°05.5	1°00.4	10.3	-22°04.3	0.9	55.3
6	270°29.0	13°06.3	15°29.7	10.3	-22°03.4	1.0	55.2
7	285°29.1	13°07.1	29°59.0	10.4	-22°02.3	1.1	55.2
8	300°29.2	13°07.9	44°28.4	10.4	-22°01.2	1.2	55.2
9	315°29.3	13°08.8	58°57.9	10.5	-21°60.0	1.3	55.2
10	330°29.5	13°09.6	73°27.3	10.5	-21°58.6	1.4	55.1
11	345°29.6	13°10.4	87°56.9	10.5	-21°57.1	1.5	55.1
12	0°29.7	13°11.2	102°26.4	10.6	-21°55.6	1.6	55.1
13	15°29.8	13°12.0	116°56.0	10.6	-21°53.9	1.7	55.1
14	30°29.9	13°12.8	131°25.6	10.7	-21°52.1	1.8	55.1
15	45°30.0	13°13.6	145°55.3	10.7	-21°50.2	1.9	55.0
16	60°30.1	13°14.5	160°25.0	10.7	-21°48.2	2.1	55.0
17	75°30.2	13°15.3	174°54.8	10.8	-21°46.1	2.2	55.0
18	90°30.3	13°16.1	189°24.6	10.8	-21°43.9	2.3	55.0
19	105°30.4	13°16.9	203°54.5	10.9	-21°41.6	2.4	54.9
20	120°30.5	13°17.7	218°24.4	10.9	-21°39.2	2.5	54.9
21	135°30.6	13°18.5	232°54.3	11.0	-21°36.6	2.6	54.9
22	150°30.7	13°19.3	247°24.3	11.0	-21°34.0	2.7	54.9
23	165°30.8	13°20.1	261°54.3	11.1	-21°31.3	2.8	54.9
	SD.=15.9	d=0.8			S.D.=15.1		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°30.9	13°20.9	276°24.4	11.1	-21°28.4	2.9	54.8
1	195°31.1	13°21.8	290°54.5	11.1	-21°25.5	3.0	54.8
2	210°31.2	13°22.6	305°24.7	11.2	-21°22.5	3.1	54.8
3	225°31.3	13°23.4	319°54.9	11.2	-21°19.4	3.2	54.8
4	240°31.4	13°24.2	334°25.1	11.3	-21°16.1	3.3	54.8
5	255°31.5	13°25.0	348°55.4	11.3	-21°12.8	3.4	54.8
6	270°31.6	13°25.8	3°25.8	11.4	-21°09.4	3.5	54.7
7	285°31.7	13°26.6	17°56.2	11.4	-21°05.8	3.6	54.7
8	300°31.8	13°27.4	32°26.6	11.5	-21°02.2	3.7	54.7
9	315°31.9	13°28.2	46°57.1	11.5	-20°58.5	3.8	54.7
10	330°32.0	13°29.0	61°27.6	11.6	-20°54.6	3.9	54.7
11	345°32.1	13°29.8	75°58.2	11.6	-20°50.7	4.0	54.6
12	0°32.2	13°30.6	90°28.9	11.7	-20°46.7	4.1	54.6
13	15°32.3	13°31.4	104°59.5	11.7	-20°42.6	4.2	54.6
14	30°32.4	13°32.2	119°30.3	11.8	-20°38.4	4.3	54.6
15	45°32.5	13°33.1	134°01.0	11.8	-20°34.1	4.3	54.6
16	60°32.6	13°33.9	148°31.9	11.8	-20°29.7	4.4	54.6
17	75°32.7	13°34.7	163°02.7	11.9	-20°25.2	4.5	54.6
18	90°32.8	13°35.5	177°33.7	11.9	-20°20.7	4.6	54.5
19	105°32.9	13°36.3	192°04.6	12.0	-20°16.0	4.7	54.5
20	120°33.0	13°37.1	206°35.6	12.0	-20°11.2	4.8	54.5
21	135°33.1	13°37.9	221°06.7	12.1	-20°06.4	4.9	54.5
22	150°33.2	13°38.7	235°37.8	12.1	-20°01.4	5.0	54.5
23	165°33.3	13°39.5	250°09.0	12.2	-19°56.4	5.1	54.5
	SD.=15.9	d=0.8			S.D.=15.0		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°33.4	13°40.3	264°40.2	12.2	-19°51.3	5.2	54.5
1	195°33.5	13°41.1	279°11.5	12.3	-19°46.1	5.3	54.4
2	210°33.6	13°41.9	293°42.8	12.3	-19°40.8	5.3	54.4
3	225°33.7	13°42.7	308°14.1	12.4	-19°35.4	5.4	54.4
4	240°33.8	13°43.5	322°45.5	12.4	-19°29.9	5.5	54.4
5	255°33.9	13°44.3	337°17.0	12.5	-19°24.4	5.6	54.4
6	270°34.0	13°45.1	351°48.5	12.5	-19°18.7	5.7	54.4
7	285°34.1	13°45.9	6°20.0	12.6	-19°13.0	5.8	54.4
8	300°34.2	13°46.7	20°51.6	12.6	-19°07.2	5.9	54.4
9	315°34.3	13°47.5	35°23.2	12.7	-19°01.3	5.9	54.4
10	330°34.4	13°48.3	49°54.9	12.7	-18°55.3	6.0	54.3
11	345°34.5	13°49.1	64°26.7	12.8	-18°49.3	6.1	54.3
12	0°34.6	13°49.9	78°58.4	12.8	-18°43.1	6.2	54.3
13	15°34.7	13°50.7	93°30.3	12.9	-18°36.9	6.3	54.3
14	30°34.8	13°51.4	108°02.1	12.9	-18°30.6	6.3	54.3
15	45°34.9	13°52.2	122°34.1	12.9	-18°24.2	6.4	54.3
16	60°35.0	13°53.0	137°06.0	13.0	-18°17.8	6.5	54.3
17	75°35.1	13°53.8	151°38.1	13.0	-18°11.2	6.6	54.3
18	90°35.2	13°54.6	166°10.1	13.1	-18°04.6	6.7	54.3
19	105°35.3	13°55.4	180°42.2	13.1	-17°57.9	6.7	54.3
20	120°35.4	13°56.2	195°14.4	13.2	-17°51.2	6.8	54.3
21	135°35.5	13°57.0	209°46.6	13.2	-17°44.3	6.9	54.3
22	150°35.6	13°57.8	224°18.8	13.3	-17°37.4	7.0	54.3
23	165°35.6	13°58.6	238°51.1	13.3	-17°30.4	7.0	54.3
	SD.=15.9	d=0.8			S.D.=14.9		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:33	21:28	–:–	–:–
70	–:–	00:57	03:01	20:59	23:14	–:–
68	–:–	01:54	03:22	20:37	22:08	–:–
66	–:–	02:26	03:38	20:20	21:34	–:–
64	00:50	02:49	03:52	20:06	21:10	23:20
62	01:40	03:08	04:03	19:54	20:51	22:21
60	02:10	03:23	04:13	19:45	20:35	21:50
58	02:31	03:35	04:21	19:36	20:23	21:27
56	02:49	03:46	04:29	19:29	20:12	21:09
54	03:03	03:55	04:35	19:22	20:02	20:55
52	03:15	04:03	04:41	19:16	19:54	20:42
50	03:26	04:11	04:46	19:10	19:46	20:32
45	03:47	04:26	04:58	18:59	19:31	20:10
40	04:03	04:38	05:07	18:49	19:18	19:53
35	04:17	04:49	05:15	18:41	19:08	19:40
30	04:27	04:57	05:22	18:34	18:59	19:29
20	04:45	05:11	05:34	18:22	18:45	19:11
10	04:58	05:23	05:45	18:11	18:33	18:58
0	05:09	05:33	05:54	18:01	18:22	18:47
-10	05:18	05:43	06:04	17:52	18:13	18:38
-20	05:26	05:52	06:14	17:41	18:04	18:30
-30	05:33	06:01	06:26	17:30	17:54	18:22
-35	05:36	06:06	06:32	17:23	17:49	18:19
-40	05:40	06:12	06:40	17:16	17:43	18:15
-45	05:43	06:18	06:48	17:07	17:37	18:12
-50	05:47	06:25	06:59	16:56	17:30	18:08
-52	05:48	06:28	07:03	16:52	17:27	18:06
-54	05:50	06:31	07:09	16:46	17:23	18:05
-56	05:51	06:35	07:14	16:40	17:20	18:03
-58	05:53	06:39	07:21	16:34	17:15	18:02
-60	05:55	06:44	07:28	16:26	17:11	17:60

		Moonrise			**Moonset**	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	05:35	–:–	–:–	07:42
68	–:–	04:44	04:36	–:–	06:53	08:41
66	03:18	03:48	04:01	06:35	07:49	09:15
64	02:38	03:15	03:36	07:14	08:22	09:39
62	02:11	02:50	03:16	07:42	08:46	09:59
60	01:50	02:31	03:00	08:03	09:05	10:14
58	01:32	02:15	02:47	08:20	09:21	10:28
56	01:18	02:01	02:35	08:35	09:34	10:39
54	01:05	01:49	02:24	08:48	09:46	10:49
52	00:54	01:39	02:15	08:59	09:56	10:58
50	00:44	01:29	02:07	09:09	10:05	11:06
45	00:23	01:10	01:49	09:29	10:25	11:23
40	00:06	00:54	01:35	09:46	10:40	11:37
35	–:–	00:40	01:23	09:60	10:54	11:48
30	–:–	00:28	01:12	10:12	11:05	11:58
20	–:–	00:08	00:54	10:33	11:25	12:16
10	23:50	–:–	00:37	10:51	11:42	12:31
0	23:34	–:–	00:22	11:08	11:58	12:45
-10	23:17	–:–	00:07	11:25	12:13	12:59
-20	22:60	23:51	–:–	11:43	12:30	13:14
-30	22:40	23:33	–:–	12:04	12:50	13:31
-35	22:28	23:22	–:–	12:16	13:01	13:41
-40	22:14	23:09	–:–	12:30	13:14	13:52
-45	21:58	22:55	23:54	12:46	13:29	14:06
-50	21:38	22:37	23:39	13:06	13:48	14:22
-52	21:28	22:28	23:31	13:16	13:56	14:29
-54	21:18	22:19	23:23	13:27	14:06	14:38
-56	21:06	22:08	23:14	13:39	14:17	14:47
-58	20:52	21:55	23:04	13:53	14:30	14:58
-60	20:35	21:41	22:53	14:10	14:45	15:10

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	01:53	01:59	11:58	04:55	17:21	20(64%)
26	02:04	02:09	11:57	05:45	18:10	21(54%)
27	02:14	02:18	11:57	06:33	18:57	22(45%)

April 28, 29 ,30 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	215°40.6	206°52.9	2°01.2	138°34.5	23°58.3	312°18.1	-22°39.8	283°33.2	-21°28.9
1	230°43.1	221°52.6	2°02.3	153°35.2	23°58.5	327°20.7	-22°39.8	298°35.6	-21°28.9
2	245°45.5	236°52.2	2°03.5	168°35.9	23°58.7	342°23.3	-22°39.8	313°38.1	-21°28.9
3	260°48.0	251°51.9	2°04.7	183°36.6	23°58.8	357°26.0	-22°39.8	328°40.5	-21°28.9
4	275°50.5	266°51.6	2°05.8	198°37.3	23°59.0	12°28.6	-22°39.7	343°43.0	-21°28.9
5	290°52.9	281°51.2	2°07.0	213°38.0	23°59.1	27°31.2	-22°39.7	358°45.5	-21°28.9
6	305°55.4	296°50.9	2°08.2	228°38.6	23°59.3	42°33.8	-22°39.7	13°47.9	-21°28.9
7	320°57.9	311°50.6	2°09.3	243°39.3	23°59.4	57°36.4	-22°39.7	28°50.4	-21°28.9
8	336°00.3	326°50.2	2°10.5	258°40.0	23°59.6	72°39.0	-22°39.7	43°52.8	-21°28.9
9	351°02.8	341°49.9	2°11.7	273°40.7	23°59.7	87°41.6	-22°39.7	58°55.3	-21°28.9
10	6°05.3	356°49.6	2°12.8	288°41.4	23°59.9	102°44.2	-22°39.7	73°57.7	-21°28.9
11	21°07.7	11°49.2	2°14.0	303°42.1	24°00.0	117°46.8	-22°39.7	89°00.2	-21°28.9
12	36°10.2	26°48.9	2°15.2	318°42.8	24°00.2	132°49.4	-22°39.7	104°02.7	-21°28.9
13	51°12.6	41°48.6	2°16.4	333°43.5	24°00.3	147°52.1	-22°39.7	119°05.1	-21°28.9
14	66°15.1	56°48.2	2°17.5	348°44.1	24°00.5	162°54.7	-22°39.7	134°07.6	-21°28.9
15	81°17.6	71°47.9	2°18.7	3°44.8	24°00.6	177°57.3	-22°39.7	149°10.0	-21°28.9
16	96°20.0	86°47.6	2°19.9	18°45.5	24°00.8	192°59.9	-22°39.7	164°12.5	-21°28.9
17	111°22.5	101°47.2	2°21.0	33°46.2	24°00.9	208°02.5	-22°39.7	179°14.9	-21°28.9
18	126°25.0	116°46.9	2°22.2	48°46.9	24°01.1	223°05.1	-22°39.7	194°17.4	-21°28.9
19	141°27.4	131°46.6	2°23.4	63°47.6	24°01.2	238°07.7	-22°39.7	209°19.9	-21°28.9
20	156°29.9	146°46.2	2°24.5	78°48.3	24°01.4	253°10.3	-22°39.7	224°22.3	-21°28.9
21	171°32.4	161°45.9	2°25.7	93°49.0	24°01.5	268°13.0	-22°39.7	239°24.8	-21°28.9
22	186°34.8	176°45.6	2°26.9	108°49.7	24°01.7	283°15.6	-22°39.6	254°27.2	-21°28.9
23	201°37.3	191°45.2	2°28.0	123°50.3	24°01.8	298°18.2	-22°39.6	269°29.7	-21°28.9
Mer.pass.:9:35:		v-0.3 d1.2 m-3.8		v0.7 d0.2 m1.6		v2.6 d0.0 m-2.3		v2.5 d-0.0 m0.5	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	216°39.8	206°44.9	2°29.2	138°51.0	24°02.0	313°20.8	-22°39.6	284°32.2	-21°28.9
1	231°42.2	221°44.6	2°30.4	153°51.7	24°02.1	328°23.4	-22°39.6	299°34.6	-21°28.9
2	246°44.7	236°44.2	2°31.5	168°52.4	24°02.3	343°26.0	-22°39.6	314°37.1	-21°28.9
3	261°47.1	251°43.9	2°32.7	183°53.1	24°02.4	358°28.6	-22°39.6	329°39.5	-21°28.9
4	276°49.6	266°43.5	2°33.9	198°53.8	24°02.5	13°31.3	-22°39.6	344°42.0	-21°28.9
5	291°52.1	281°43.2	2°35.0	213°54.5	24°02.7	28°33.9	-22°39.6	359°44.5	-21°28.9
6	306°54.5	296°42.9	2°36.2	228°55.2	24°02.8	43°36.5	-22°39.6	14°46.9	-21°28.9
7	321°57.0	311°42.5	2°37.4	243°55.8	24°03.0	58°39.1	-22°39.6	29°49.4	-21°28.9
8	336°59.5	326°42.2	2°38.6	258°56.5	24°03.1	73°41.7	-22°39.6	44°51.8	-21°28.9
9	352°01.9	341°41.9	2°39.7	273°57.2	24°03.3	88°44.4	-22°39.6	59°54.3	-21°28.9
10	7°04.4	356°41.5	2°40.9	288°57.9	24°03.4	103°47.0	-22°39.6	74°56.8	-21°28.9
11	22°06.9	11°41.2	2°42.1	303°58.6	24°03.6	118°49.6	-22°39.6	89°59.2	-21°28.9
12	37°09.3	26°40.9	2°43.2	318°59.3	24°03.7	133°52.2	-22°39.6	105°01.7	-21°28.9
13	52°11.8	41°40.5	2°44.4	333°60.0	24°03.8	148°54.8	-22°39.6	120°04.1	-21°28.9
14	67°14.3	56°40.2	2°45.6	349°00.7	24°04.0	163°57.4	-22°39.6	135°06.6	-21°28.9
15	82°16.7	71°39.9	2°46.7	4°01.3	24°04.1	179°00.1	-22°39.6	150°09.1	-21°28.9
16	97°19.2	86°39.5	2°47.9	19°02.0	24°04.3	194°02.7	-22°39.5	165°11.5	-21°28.9
17	112°21.6	101°39.2	2°49.1	34°02.7	24°04.4	209°05.3	-22°39.5	180°14.0	-21°28.9
18	127°24.1	116°38.9	2°50.2	49°03.4	24°04.5	224°07.9	-22°39.5	195°16.4	-21°28.9
19	142°26.6	131°38.5	2°51.4	64°04.1	24°04.7	239°10.6	-22°39.5	210°18.9	-21°28.9
20	157°29.0	146°38.2	2°52.6	79°04.8	24°04.8	254°13.2	-22°39.5	225°21.4	-21°28.9
21	172°31.5	161°37.8	2°53.7	94°05.5	24°05.0	269°15.8	-22°39.5	240°23.8	-21°28.9
22	187°34.0	176°37.5	2°54.9	109°06.1	24°05.1	284°18.4	-22°39.5	255°26.3	-21°28.9
23	202°36.4	191°37.2	2°56.1	124°06.8	24°05.2	299°21.0	-22°39.5	270°28.8	-21°28.9
Mer.pass.:9:31:		v-0.3 d1.2 m-3.8		v0.7 d0.1 m1.6		v2.6 d0.0 m-2.3		v2.5 d-0.0 m0.5	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	217°38.9	206°36.8	2°57.2	139°07.5	24°05.4	314°23.7	-22°39.5	285°31.2	-21°28.9
1	232°41.4	221°36.5	2°58.4	154°08.2	24°05.5	329°26.3	-22°39.5	300°33.7	-21°28.9
2	247°43.8	236°36.2	2°59.6	169°08.9	24°05.7	344°28.9	-22°39.5	315°36.2	-21°28.9
3	262°46.3	251°35.8	3°00.7	184°09.6	24°05.8	359°31.5	-22°39.5	330°38.6	-21°28.9
4	277°48.7	266°35.5	3°01.9	199°10.3	24°05.9	14°34.2	-22°39.5	345°41.1	-21°28.9
5	292°51.2	281°35.2	3°03.1	214°11.0	24°06.1	29°36.8	-22°39.5	0°43.5	-21°28.9
6	307°53.7	296°34.8	3°04.2	229°11.6	24°06.2	44°39.4	-22°39.5	15°46.0	-21°28.9
7	322°56.1	311°34.5	3°05.4	244°12.3	24°06.3	59°42.0	-22°39.5	30°48.5	-21°28.9
8	337°58.6	326°34.1	3°06.6	259°13.0	24°06.5	74°44.7	-22°39.5	45°50.9	-21°28.9
9	353°01.1	341°33.8	3°07.7	274°13.7	24°06.6	89°47.3	-22°39.4	60°53.4	-21°28.9
10	8°03.5	356°33.5	3°08.9	289°14.4	24°06.8	104°49.9	-22°39.4	75°55.9	-21°28.9
11	23°06.0	11°33.1	3°10.1	304°15.1	24°06.9	119°52.5	-22°39.4	90°58.3	-21°28.9
12	38°08.5	26°32.8	3°11.2	319°15.8	24°07.0	134°55.2	-22°39.4	106°00.8	-21°28.9
13	53°10.9	41°32.5	3°12.4	334°16.4	24°07.2	149°57.8	-22°39.4	121°03.3	-21°28.9
14	68°13.4	56°32.1	3°13.6	349°17.1	24°07.3	165°00.4	-22°39.4	136°05.7	-21°28.9
15	83°15.9	71°31.8	3°14.7	4°17.8	24°07.4	180°03.0	-22°39.4	151°08.2	-21°28.9
16	98°18.3	86°31.4	3°15.9	19°18.5	24°07.6	195°05.7	-22°39.4	166°10.7	-21°28.9
17	113°20.8	101°31.1	3°17.1	34°19.2	24°07.7	210°08.3	-22°39.4	181°13.1	-21°28.9
18	128°23.2	116°30.8	3°18.2	49°19.9	24°07.8	225°10.9	-22°39.4	196°15.6	-21°28.9
19	143°25.7	131°30.4	3°19.4	64°20.6	24°08.0	240°13.6	-22°39.4	211°18.1	-21°28.9
20	158°28.2	146°30.1	3°20.6	79°21.3	24°08.1	255°16.2	-22°39.4	226°20.5	-21°28.9
21	173°30.6	161°29.7	3°21.7	94°21.9	24°08.2	270°18.8	-22°39.4	241°23.0	-21°29.0
22	188°33.1	176°29.4	3°22.9	109°22.6	24°08.4	285°21.4	-22°39.4	256°25.5	-21°29.0
23	203°35.6	191°29.1	3°24.1	124°23.3	24°08.5	300°24.1	-22°39.4	271°27.9	-21°29.0
Mer.pass.:9:27:		v-0.3 d1.2 m-3.8		v0.7 d0.1 m1.6		v2.6 d0.0 m-2.3		v2.5 d-0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.1	-42°12.1
Schedar	349°36.5	56°38.3
Diphda	348°52.1	-17°53.0
Achernar	335°24.4	-57°08.5
Hamal	327°56.6	23°33.0
Polaris	316°30.2	89°20.6
Akamar	315°15.7	-40°13.9
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.1
Capella	280°28.9	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.7	-52°42.7
Sirius	258°30.3	-16°44.7
Adara	255°09.5	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.7
Avior	234°16.5	-59°34.6
Suhail	222°49.5	-43°30.9
Miaplacidus	221°38.8	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.1	11°52.4
Dubhe	193°46.4	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.3	-63°12.4
Gacrux	171°56.0	-57°13.4
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.1
Hadar	148°41.6	-60°27.9
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.7	-60°54.8
Zubenelg.	137°00.7	-16°07.2
Kochab	137°18.9	74°04.7
Alphecca	126°07.3	26°39.0
Antares	112°21.0	-26°28.3
Atria	107°18.8	-69°03.4
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°06.8
Rasalhague	96°02.5	12°32.8
Etamin	90°43.9	51°29.0
Kaus Aust.	83°38.3	-34°22.3
Vega	80°36.1	38°47.9
Nunki	75°53.2	-26°16.2
Altair	62°04.4	8°55.0
Peacock	53°12.9	-56°40.1
Deneb	49°28.8	45°20.7
Enif	33°43.3	9°57.6
Alnair	27°38.9	-46°51.9
Fomalhaut	15°19.9	-29°31.2
Scheat	13°49.8	28°10.9
Markab	13°34.6	15°18.3

2019/4/2	SHA	Mer.pass
Venus	351°12.3	10:13
Mars	282°53.9	14:45
Jupiter	96°37.5	03:10
Saturn	67°52.6	05:05

2019/4/2	SHA	Mer.pass
Venus	350°05.1	10:13
Mars	282°11.3	14:44
Jupiter	96°41.0	03:06
Saturn	67°52.4	05:01

2019/4/3	SHA	Mer.pass
Venus	348°57.9	10:14
Mars	281°28.6	14:43
Jupiter	96°44.8	03:02
Saturn	67°52.3	04:57

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°35.7	13°59.4	253°23.4	13.4	-17°23.3	7.1	54.2
1	195°35.8	14°00.2	267°55.8	13.4	-17°16.2	7.2	54.2
2	210°35.9	14°01.0	282°28.2	13.4	-17°08.9	7.3	54.2
3	225°36.0	14°01.8	297°00.7	13.5	-17°01.6	7.3	54.2
4	240°36.1	14°02.5	311°33.2	13.5	-16°54.3	7.4	54.2
5	255°36.2	14°03.3	326°05.7	13.6	-16°46.8	7.5	54.2
6	270°36.3	14°04.1	340°38.3	13.6	-16°39.3	7.5	54.2
7	285°36.4	14°04.9	355°10.9	13.7	-16°31.7	7.6	54.2
8	300°36.5	14°05.7	9°43.6	13.7	-16°24.1	7.7	54.2
9	315°36.6	14°06.5	24°16.3	13.7	-16°16.4	7.8	54.2
10	330°36.7	14°07.3	38°49.1	13.8	-16°08.6	7.8	54.2
11	345°36.8	14°08.1	53°21.9	13.8	-16°00.7	7.9	54.2
12	0°36.9	14°08.9	67°54.7	13.9	-15°52.8	8.0	54.2
13	15°37.0	14°09.6	82°27.6	13.9	-15°44.8	8.0	54.2
14	30°37.0	14°10.4	97°00.5	13.9	-15°36.7	8.1	54.2
15	45°37.1	14°11.2	111°33.5	14.0	-15°28.6	8.2	54.2
16	60°37.2	14°12.0	126°06.5	14.0	-15°20.4	8.2	54.2
17	75°37.3	14°12.8	140°39.5	14.0	-15°12.2	8.3	54.2
18	90°37.4	14°13.6	155°12.5	14.1	-15°03.9	8.4	54.2
19	105°37.5	14°14.3	169°45.7	14.1	-14°55.5	8.4	54.2
20	120°37.6	14°15.1	184°18.8	14.2	-14°47.0	8.5	54.2
21	135°37.7	14°15.9	198°52.0	14.2	-14°38.5	8.5	54.2
22	150°37.8	14°16.7	213°25.2	14.2	-14°30.0	8.6	54.2
23	165°37.9	14°17.5	227°58.4	14.3	-14°21.3	8.7	54.2
	SD.=15.9	d=0.8			S.D.=14.8		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°37.9	14°18.3	242°31.7	14.3	-14°12.6	8.7	54.2
1	195°38.0	14°19.0	257°05.0	14.3	-14°03.9	8.8	54.2
2	210°38.1	14°19.8	271°38.4	14.4	-13°55.1	8.8	54.2
3	225°38.2	14°20.6	286°11.7	14.4	-13°46.2	8.9	54.2
4	240°38.3	14°21.4	300°45.2	14.4	-13°37.3	9.0	54.2
5	255°38.4	14°22.2	315°18.6	14.5	-13°28.3	9.0	54.2
6	270°38.5	14°22.9	329°52.1	14.5	-13°19.2	9.1	54.2
7	285°38.6	14°23.7	344°25.6	14.5	-13°10.1	9.1	54.2
8	300°38.6	14°24.5	358°59.1	14.6	-13°01.0	9.2	54.2
9	315°38.7	14°25.3	13°32.7	14.6	-12°51.8	9.2	54.2
10	330°38.8	14°26.1	28°06.3	14.6	-12°42.5	9.3	54.2
11	345°38.9	14°26.8	42°39.9	14.6	-12°33.2	9.3	54.2
12	0°39.0	14°27.6	57°13.6	14.7	-12°23.8	9.4	54.2
13	15°39.1	14°28.4	71°47.3	14.7	-12°14.4	9.5	54.2
14	30°39.2	14°29.2	86°21.0	14.7	-12°04.9	9.5	54.2
15	45°39.3	14°29.9	100°54.7	14.7	-11°55.4	9.6	54.3
16	60°39.3	14°30.7	115°28.5	14.8	-11°45.8	9.6	54.3
17	75°39.4	14°31.5	130°02.2	14.8	-11°36.1	9.7	54.3
18	90°39.5	14°32.3	144°36.0	14.8	-11°26.5	9.7	54.3
19	105°39.6	14°33.0	159°09.9	14.8	-11°16.7	9.8	54.3
20	120°39.7	14°33.8	173°43.7	14.9	-11°06.9	9.8	54.3
21	135°39.8	14°34.6	188°17.6	14.9	-10°57.1	9.9	54.3
22	150°39.8	14°35.4	202°51.5	14.9	-10°47.2	9.9	54.3
23	165°39.9	14°36.1	217°25.4	14.9	-10°37.3	10.0	54.3
	SD.=15.9	d=0.8			S.D.=14.8		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°40.0	14°36.9	231°59.4	15.0	-10°27.3	10.0	54.3
1	195°40.1	14°37.7	246°33.3	15.0	-10°17.3	10.0	54.3
2	210°40.2	14°38.4	261°07.3	15.0	-10°07.2	10.1	54.3
3	225°40.3	14°39.2	275°41.3	15.0	-9°57.1	10.1	54.3
4	240°40.3	14°40.0	290°15.3	15.0	-9°47.0	10.2	54.4
5	255°40.4	14°40.8	304°49.4	15.0	-9°36.8	10.2	54.4
6	270°40.5	14°41.5	319°23.4	15.1	-9°26.5	10.3	54.4
7	285°40.6	14°42.3	333°57.5	15.1	-9°16.2	10.3	54.4
8	300°40.7	14°43.1	348°31.6	15.1	-9°05.9	10.3	54.4
9	315°40.8	14°43.8	3°05.7	15.1	-8°55.5	10.4	54.4
10	330°40.8	14°44.6	17°39.8	15.1	-8°45.1	10.4	54.4
11	345°40.9	14°45.4	32°13.9	15.1	-8°34.7	10.5	54.4
12	0°41.0	14°46.1	46°48.1	15.1	-8°24.2	10.5	54.4
13	15°41.1	14°46.9	61°22.2	15.2	-8°13.7	10.5	54.4
14	30°41.2	14°47.7	75°56.4	15.2	-8°03.1	10.6	54.5
15	45°41.2	14°48.4	90°30.5	15.2	-7°52.5	10.6	54.5
16	60°41.3	14°49.2	105°04.7	15.2	-7°41.8	10.7	54.5
17	75°41.4	14°50.0	119°38.9	15.2	-7°31.2	10.7	54.5
18	90°41.5	14°50.7	134°13.1	15.2	-7°20.5	10.7	54.5
19	105°41.6	14°51.5	148°47.3	15.2	-7°09.7	10.8	54.5
20	120°41.6	14°52.3	163°21.5	15.2	-6°58.9	10.8	54.5
21	135°41.7	14°53.0	177°55.8	15.2	-6°48.1	10.8	54.5
22	150°41.8	14°53.8	192°30.0	15.2	-6°37.2	10.9	54.6
23	165°41.9	14°54.5	207°04.2	15.2	-6°26.4	10.9	54.6
	SD.=15.9	d=0.8			S.D.=14.8		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:11	21:50	–:–	–:–
70	–:–	–:–	02:44	21:15	–:–	–:–
68	–:–	01:30	03:08	20:50	22:33	–:–
66	–:–	02:09	03:27	20:31	21:50	–:–
64	–:–	02:36	03:42	20:15	21:22	–:–
62	01:19	02:56	03:54	20:03	21:01	22:43
60	01:55	03:13	04:04	19:52	20:44	22:04
58	02:20	03:26	04:14	19:43	20:31	21:38
56	02:39	03:38	04:22	19:35	20:19	21:19
54	02:54	03:48	04:29	19:27	20:08	21:03
52	03:07	03:57	04:35	19:21	19:59	20:49
50	03:19	04:05	04:41	19:15	19:51	20:38
45	03:41	04:21	04:53	19:03	19:35	20:15
40	03:59	04:34	05:03	18:52	19:21	19:57
35	04:13	04:45	05:12	18:43	19:10	19:43
30	04:24	04:54	05:19	18:36	19:01	19:31
20	04:42	05:09	05:32	18:23	18:46	19:13
10	04:56	05:22	05:44	18:11	18:33	18:59
0	05:08	05:33	05:54	18:01	18:22	18:47
-10	05:18	05:43	06:04	17:50	18:12	18:37
-20	05:26	05:53	06:15	17:39	18:02	18:28
-30	05:35	06:03	06:28	17:27	17:52	18:20
-35	05:39	06:08	06:35	17:20	17:46	18:16
-40	05:43	06:15	06:43	17:12	17:40	18:12
-45	05:47	06:21	06:52	17:02	17:33	18:08
-50	05:51	06:29	07:03	16:51	17:25	18:03
-52	05:53	06:33	07:08	16:46	17:21	18:01
-54	05:55	06:36	07:14	16:40	17:18	17:59
-56	05:57	06:41	07:20	16:34	17:13	17:57
-58	05:59	06:45	07:27	16:27	17:09	17:55
-60	06:01	06:50	07:35	16:18	17:04	17:53

		Moonrise			**Moonset**	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	05:49	05:10	04:48	09:05	11:16	13:08
70	05:01	04:45	04:33	09:52	11:40	13:21
68	04:30	04:26	04:21	10:22	11:58	13:31
66	04:07	04:10	04:11	10:44	12:12	13:40
64	03:49	03:57	04:03	11:01	12:24	13:47
62	03:34	03:46	03:55	11:16	12:34	13:53
60	03:21	03:37	03:49	11:28	12:43	13:59
58	03:10	03:29	03:44	11:38	12:50	14:03
56	03:01	03:21	03:39	11:47	12:57	14:07
54	02:52	03:15	03:34	11:55	13:03	14:11
52	02:45	03:09	03:30	12:02	13:08	14:15
50	02:38	03:04	03:26	12:09	13:13	14:18
45	02:23	02:52	03:19	12:23	13:23	14:24
40	02:11	02:43	03:12	12:34	13:32	14:30
35	02:01	02:35	03:06	12:44	13:39	14:34
30	01:51	02:27	03:01	12:52	13:45	14:38
20	01:36	02:15	02:52	13:06	13:56	14:46
10	01:22	02:04	02:44	13:19	14:06	14:52
0	01:09	01:54	02:37	13:31	14:15	14:58
-10	00:56	01:43	02:30	13:42	14:24	15:03
-20	00:42	01:32	02:22	13:55	14:33	15:09
-30	00:26	01:20	02:13	14:09	14:44	15:16
-35	00:17	01:12	02:08	14:17	14:50	15:20
-40	00:06	01:04	02:02	14:26	14:57	15:25
-45	–:–	00:54	01:55	14:37	15:05	15:30
-50	–:–	00:42	01:46	14:50	15:14	15:36
-52	–:–	00:36	01:43	14:56	15:19	15:39
-54	–:–	00:30	01:38	15:03	15:24	15:42
-56	–:–	00:23	01:34	15:10	15:29	15:45
-58	–:–	00:16	01:28	15:18	15:35	15:49
-60	–:–	00:07	01:22	15:28	15:42	15:53

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	02:23	02:27	11:57	07:19	19:42	23(35%)
29	02:32	02:36	11:57	08:04	20:25	24(27%)
30	02:40	02:44	11:57	08:47	21:08	25(19%)

May 01, 02 ,03 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	218°38.0	206°28.7	3°25.2	139°24.0	24°08.6	315°26.7	-22°39.4	286°30.4	-21°29.0
1	233°40.5	221°28.4	3°26.4	154°24.7	24°08.7	330°29.3	-22°39.3	301°32.9	-21°29.0
2	248°43.0	236°28.1	3°27.6	169°25.4	24°08.9	345°32.0	-22°39.3	316°35.3	-21°29.0
3	263°45.4	251°27.7	3°28.7	184°26.1	24°09.0	0°34.6	-22°39.3	331°37.8	-21°29.0
4	278°47.9	266°27.4	3°29.9	199°26.7	24°09.1	15°37.2	-22°39.3	346°40.3	-21°29.0
5	293°50.3	281°27.0	3°31.0	214°27.4	24°09.3	30°39.9	-22°39.3	1°42.7	-21°29.0
6	308°52.8	296°26.7	3°32.2	229°28.1	24°09.4	45°42.5	-22°39.3	16°45.2	-21°29.0
7	323°55.3	311°26.4	3°33.4	244°28.8	24°09.5	60°45.1	-22°39.3	31°47.7	-21°29.0
8	338°57.7	326°26.0	3°34.5	259°29.5	24°09.6	75°47.8	-22°39.3	46°50.2	-21°29.0
9	354°00.2	341°25.7	3°35.7	274°30.2	24°09.8	90°50.4	-22°39.3	61°52.6	-21°29.0
10	9°02.7	356°25.3	3°36.9	289°30.9	24°09.9	105°53.0	-22°39.3	76°55.1	-21°29.0
11	24°05.1	11°25.0	3°38.0	304°31.5	24°10.0	120°55.7	-22°39.3	91°57.6	-21°29.0
12	39°07.6	26°24.7	3°39.2	319°32.2	24°10.2	135°58.3	-22°39.3	107°00.0	-21°29.0
13	54°10.1	41°24.3	3°40.4	334°32.9	24°10.3	151°00.9	-22°39.3	122°02.5	-21°29.0
14	69°12.5	56°24.0	3°41.5	349°33.6	24°10.4	166°03.6	-22°39.3	137°05.0	-21°29.0
15	84°15.0	71°23.6	3°42.7	4°34.3	24°10.5	181°06.2	-22°39.3	152°07.4	-21°29.0
16	99°17.5	86°23.3	3°43.9	19°35.0	24°10.7	196°08.8	-22°39.3	167°09.9	-21°29.0
17	114°19.9	101°23.0	3°45.0	34°35.7	24°10.8	211°11.5	-22°39.2	182°12.4	-21°29.0
18	129°22.4	116°22.6	3°46.2	49°36.3	24°10.9	226°14.1	-22°39.2	197°14.9	-21°29.0
19	144°24.8	131°22.3	3°47.3	64°37.0	24°11.0	241°16.7	-22°39.2	212°17.3	-21°29.0
20	159°27.3	146°21.9	3°48.5	79°37.7	24°11.2	256°19.4	-22°39.2	227°19.8	-21°29.0
21	174°29.8	161°21.6	3°49.7	94°38.4	24°11.3	271°22.0	-22°39.2	242°22.3	-21°29.0
22	189°32.2	176°21.2	3°50.8	109°39.1	24°11.4	286°24.7	-22°39.2	257°24.7	-21°29.0
23	204°34.7	191°20.9	3°52.0	124°39.8	24°11.5	301°27.3	-22°39.2	272°27.2	-21°29.0
Mer.pass.:9:23:		v-0.3 d1.2 m-3.8		v0.7 d0.1 m1.6		v2.6 d0.0 m-2.3		v2.5 d-0.0 m0.5	

Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	219°37.2	206°20.6	3°53.2	139°40.5	24°11.6	316°29.9	-22°39.2	287°29.7	-21°29.0
1	234°39.6	221°20.2	3°54.3	154°41.1	24°11.8	331°32.6	-22°39.2	302°32.2	-21°29.0
2	249°42.1	236°19.9	3°55.5	169°41.8	24°11.9	346°35.2	-22°39.2	317°34.6	-21°29.0
3	264°44.6	251°19.5	3°56.7	184°42.5	24°12.0	1°37.9	-22°39.2	332°37.1	-21°29.0
4	279°47.0	266°19.2	3°57.8	199°43.2	24°12.1	16°40.5	-22°39.2	347°39.6	-21°29.0
5	294°49.5	281°18.9	3°59.0	214°43.9	24°12.3	31°43.1	-22°39.2	2°42.1	-21°29.0
6	309°51.9	296°18.5	4°00.1	229°44.6	24°12.4	46°45.8	-22°39.2	17°44.5	-21°29.0
7	324°54.4	311°18.2	4°01.3	244°45.3	24°12.5	61°48.4	-22°39.2	32°47.0	-21°29.0
8	339°56.9	326°17.8	4°02.5	259°45.9	24°12.6	76°51.1	-22°39.1	47°49.5	-21°29.0
9	354°59.3	341°17.5	4°03.6	274°46.6	24°12.7	91°53.7	-22°39.1	62°51.9	-21°29.1
10	10°01.8	356°17.1	4°04.8	289°47.3	24°12.9	106°56.3	-22°39.1	77°54.4	-21°29.1
11	25°04.3	11°16.8	4°06.0	304°48.0	24°13.0	121°59.0	-22°39.1	92°56.9	-21°29.1
12	40°06.7	26°16.5	4°07.1	319°48.7	24°13.1	137°01.6	-22°39.1	107°59.4	-21°29.1
13	55°09.2	41°16.1	4°08.3	334°49.4	24°13.2	152°04.3	-22°39.1	123°01.8	-21°29.1
14	70°11.7	56°15.8	4°09.4	349°50.1	24°13.3	167°06.9	-22°39.1	138°04.3	-21°29.1
15	85°14.1	71°15.4	4°10.6	4°50.7	24°13.4	182°09.5	-22°39.1	153°06.8	-21°29.1
16	100°16.6	86°15.1	4°11.8	19°51.4	24°13.6	197°12.2	-22°39.1	168°09.3	-21°29.1
17	115°19.1	101°14.7	4°12.9	34°52.1	24°13.7	212°14.8	-22°39.1	183°11.7	-21°29.1
18	130°21.5	116°14.4	4°14.1	49°52.8	24°13.8	227°17.5	-22°39.1	198°14.2	-21°29.1
19	145°24.0	131°14.1	4°15.3	64°53.5	24°13.9	242°20.1	-22°39.1	213°16.7	-21°29.1
20	160°26.4	146°13.7	4°16.4	79°54.2	24°14.0	257°22.8	-22°39.1	228°19.2	-21°29.1
21	175°28.9	161°13.4	4°17.6	94°54.9	24°14.1	272°25.4	-22°39.1	243°21.6	-21°29.1
22	190°31.4	176°13.0	4°18.7	109°55.5	24°14.3	287°28.1	-22°39.0	258°24.1	-21°29.1
23	205°33.8	191°12.7	4°19.9	124°56.2	24°14.4	302°30.7	-22°39.0	273°26.6	-21°29.1
Mer.pass.:9:19:		v-0.3 d1.2 m-3.8		v0.7 d0.1 m1.6		v2.6 d0.0 m-2.3		v2.5 d-0.0 m0.5	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	220°36.3	206°12.3	4°21.1	139°56.9	24°14.5	317°33.3	-22°39.0	288°29.1	-21°29.1
1	235°38.8	221°12.0	4°22.2	154°57.6	24°14.6	332°36.0	-22°39.0	303°31.6	-21°29.1
2	250°41.2	236°11.6	4°23.4	169°58.3	24°14.7	347°38.6	-22°39.0	318°34.0	-21°29.1
3	265°43.7	251°11.3	4°24.5	184°59.0	24°14.8	2°41.3	-22°39.0	333°36.5	-21°29.1
4	280°46.2	266°10.9	4°25.7	199°59.7	24°14.9	17°43.9	-22°39.0	348°39.0	-21°29.1
5	295°48.6	281°10.6	4°26.9	215°00.3	24°15.0	32°46.6	-22°39.0	3°41.5	-21°29.1
6	310°51.1	296°10.3	4°28.0	230°01.0	24°15.2	47°49.2	-22°39.0	18°43.9	-21°29.1
7	325°53.6	311°09.9	4°29.2	245°01.7	24°15.3	62°51.9	-22°39.0	33°46.4	-21°29.1
8	340°56.0	326°09.6	4°30.3	260°02.4	24°15.4	77°54.5	-22°39.0	48°48.9	-21°29.1
9	355°58.5	341°09.2	4°31.5	275°03.1	24°15.5	92°57.2	-22°39.0	63°51.4	-21°29.1
10	11°00.9	356°08.9	4°32.7	290°03.8	24°15.6	107°59.8	-22°39.0	78°53.9	-21°29.1
11	26°03.4	11°08.5	4°33.8	305°04.4	24°15.7	123°02.5	-22°39.0	93°56.3	-21°29.1
12	41°05.9	26°08.2	4°35.0	320°05.1	24°15.8	138°05.1	-22°39.0	108°58.8	-21°29.1
13	56°08.3	41°07.8	4°36.1	335°05.8	24°15.9	153°07.8	-22°38.9	124°01.3	-21°29.2
14	71°10.8	56°07.5	4°37.3	350°06.5	24°16.0	168°10.4	-22°38.9	139°03.8	-21°29.2
15	86°13.3	71°07.1	4°38.5	5°07.2	24°16.2	183°13.1	-22°38.9	154°06.2	-21°29.2
16	101°15.7	86°06.8	4°39.6	20°07.9	24°16.3	198°15.7	-22°38.9	169°08.7	-21°29.2
17	116°18.2	101°06.4	4°40.8	35°08.6	24°16.4	213°18.4	-22°38.9	184°11.2	-21°29.2
18	131°20.7	116°06.1	4°41.9	50°09.2	24°16.5	228°21.0	-22°38.9	199°13.7	-21°29.2
19	146°23.1	131°05.8	4°43.1	65°09.9	24°16.6	243°23.7	-22°38.9	214°16.2	-21°29.2
20	161°25.6	146°05.4	4°44.2	80°10.6	24°16.7	258°26.3	-22°38.9	229°18.6	-21°29.2
21	176°28.0	161°05.1	4°45.4	95°11.3	24°16.8	273°29.0	-22°38.9	244°21.1	-21°29.2
22	191°30.5	176°04.7	4°46.6	110°12.0	24°16.9	288°31.6	-22°38.9	259°23.6	-21°29.2
23	206°33.0	191°04.4	4°47.7	125°12.7	24°17.0	303°34.3	-22°38.9	274°26.1	-21°29.2
Mer.pass.:9:16:		v-0.3 d1.2 m-3.8		v0.7 d0.1 m1.6		v2.6 d0.0 m-2.3		v2.5 d-0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.1	-42°12.1
Schedar	349°36.5	56°38.3
Diphda	348°52.1	-17°53.0
Achernar	335°24.4	-57°08.4
Hamal	327°56.6	23°33.0
Polaris	316°30.4	89°20.6
Akamar	315°15.7	-40°13.9
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.7	-52°42.7
Sirius	258°30.3	-16°44.7
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.7
Avior	234°16.5	-59°34.6
Suhail	222°49.5	-43°30.9
Miaplacidus	221°38.8	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.1	11°52.4
Dubhe	193°46.4	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.3	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.2
Hadar	148°41.6	-60°27.9
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.8
Zubenelg.	137°00.7	-16°07.2
Kochab	137°18.9	74°04.7
Alphecca	126°07.3	26°39.0
Antares	112°21.0	-26°28.3
Atria	107°18.8	-69°03.4
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°06.8
Rasalhague	96°02.5	12°32.8
Etamin	90°43.9	51°29.0
Kaus Aust.	83°38.3	-34°22.3
Vega	80°36.1	38°47.9
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.0
Peacock	53°12.9	-56°40.1
Deneb	49°28.8	45°20.7
Enif	33°43.3	9°57.6
Alnair	27°38.9	-46°51.9
Fomalhaut	15°19.9	-29°31.2
Scheat	13°49.8	28°10.9
Markab	13°34.6	15°18.3

2019/5/1	SHA	Mer.pass
Venus	347°50.7	10:14
Mars	280°46.0	14:42
Jupiter	96°48.7	02:58
Saturn	67°52.4	04:53

2019/5/2	SHA	Mer.pass
Venus	346°43.4	10:15
Mars	280°03.3	14:41
Jupiter	96°52.8	02:53
Saturn	67°52.5	04:49

2019/5/3	SHA	Mer.pass
Venus	345°36.0	10:15
Mars	279°20.6	14:40
Jupiter	96°57.0	02:49
Saturn	67°52.8	04:45

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°41.9	14°55.3	221°38.4	15.2	-6°15.4	10.9	54.6
1	195°42.0	14°56.1	236°12.7	15.2	-6°04.5	11.0	54.6
2	210°42.1	14°56.8	250°46.9	15.2	-5°53.5	11.0	54.6
3	225°42.2	14°57.6	265°21.2	15.2	-5°42.5	11.0	54.6
4	240°42.3	14°58.3	279°55.4	15.2	-5°31.5	11.1	54.6
5	255°42.3	14°59.1	294°29.7	15.2	-5°20.4	11.1	54.6
6	270°42.4	14°59.9	309°03.9	15.2	-5°09.3	11.1	54.7
7	285°42.5	15°00.6	323°38.1	15.2	-4°58.2	11.1	54.7
8	300°42.6	15°01.4	338°12.4	15.2	-4°47.0	11.2	54.7
9	315°42.6	15°02.1	352°46.6	15.2	-4°35.8	11.2	54.7
10	330°42.7	15°02.9	7°20.9	15.2	-4°24.6	11.2	54.7
11	345°42.8	15°03.7	21°55.1	15.2	-4°13.4	11.2	54.7
12	0°42.9	15°04.4	36°29.3	15.2	-4°02.1	11.3	54.8
13	15°42.9	15°05.2	51°03.5	15.2	-3°50.8	11.3	54.8
14	30°43.0	15°05.9	65°37.8	15.2	-3°39.5	11.3	54.8
15	45°43.1	15°06.7	80°12.0	15.2	-3°28.2	11.3	54.8
16	60°43.2	15°07.4	94°46.2	15.2	-3°16.9	11.4	54.8
17	75°43.2	15°08.2	109°20.4	15.2	-3°05.5	11.4	54.8
18	90°43.3	15°08.9	123°54.5	15.2	-2°54.1	11.4	54.9
19	105°43.4	15°09.7	138°28.7	15.2	-2°42.7	11.4	54.9
20	120°43.5	15°10.5	153°02.9	15.2	-2°31.2	11.4	54.9
21	135°43.5	15°11.2	167°37.0	15.1	-2°19.8	11.5	54.9
22	150°43.6	15°12.0	182°11.2	15.1	-2°08.3	11.5	54.9
23	165°43.7	15°12.7	196°45.3	15.1	-1°56.8	11.5	54.9
	SD.=15.9	d=0.8			S.D.=14.9		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°43.7	15°13.5	211°19.4	15.1	-1°45.3	11.5	55.0
1	195°43.8	15°14.2	225°53.5	15.1	-1°33.8	11.5	55.0
2	210°43.9	15°15.0	240°27.6	15.1	-1°22.3	11.5	55.0
3	225°44.0	15°15.7	255°01.6	15.1	-1°10.7	11.6	55.0
4	240°44.0	15°16.5	269°35.7	15.0	-0°59.2	11.6	55.0
5	255°44.1	15°17.2	284°09.7	15.0	-0°47.6	11.6	55.0
6	270°44.2	15°18.0	298°43.7	15.0	-0°36.0	11.6	55.1
7	285°44.2	15°18.7	313°17.7	15.0	-0°24.4	11.6	55.1
8	300°44.3	15°19.5	327°51.7	15.0	-0°12.8	11.6	55.1
9	315°44.4	15°20.2	342°25.6	14.9	-0°01.2	11.6	55.1
10	330°44.5	15°21.0	356°59.5	14.9	0°10.4	11.6	55.1
11	345°44.5	15°21.7	11°33.4	14.9	0°22.1	11.6	55.2
12	0°44.6	15°22.4	26°07.3	14.9	0°33.7	11.6	55.2
13	15°44.7	15°23.2	40°41.2	14.8	0°45.4	11.7	55.2
14	30°44.7	15°23.9	55°15.0	14.8	0°57.0	11.7	55.2
15	45°44.8	15°24.7	69°48.8	14.8	1°08.7	11.7	55.2
16	60°44.9	15°25.4	84°22.6	14.8	1°20.4	11.7	55.3
17	75°44.9	15°26.2	98°56.3	14.7	1°32.0	11.7	55.3
18	90°45.0	15°26.9	113°30.1	14.7	1°43.7	11.7	55.3
19	105°45.1	15°27.7	128°03.8	14.7	1°55.4	11.7	55.3
20	120°45.1	15°28.4	142°37.4	14.7	2°07.1	11.7	55.3
21	135°45.2	15°29.1	157°11.1	14.6	2°18.8	11.7	55.4
22	150°45.3	15°29.9	171°44.7	14.6	2°30.4	11.7	55.4
23	165°45.3	15°30.6	186°18.3	14.6	2°42.1	11.7	55.4
	SD.=15.9	d=0.8			S.D.=15.0		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°45.4	15°31.4	200°51.8	14.5	2°53.8	11.7	55.4
1	195°45.5	15°32.1	215°25.3	14.5	3°05.5	11.7	55.4
2	210°45.5	15°32.9	229°58.8	14.5	3°17.2	11.7	55.5
3	225°45.6	15°33.6	244°32.2	14.4	3°28.8	11.7	55.5
4	240°45.7	15°34.3	259°05.6	14.4	3°40.5	11.7	55.5
5	255°45.7	15°35.1	273°39.0	14.3	3°52.1	11.7	55.5
6	270°45.8	15°35.8	288°12.3	14.3	4°03.8	11.6	55.6
7	285°45.9	15°36.5	302°45.6	14.3	4°15.4	11.6	55.6
8	300°45.9	15°37.3	317°18.8	14.2	4°27.1	11.6	55.6
9	315°46.0	15°38.0	331°52.1	14.2	4°38.7	11.6	55.6
10	330°46.1	15°38.8	346°25.2	14.2	4°50.3	11.6	55.6
11	345°46.1	15°39.5	0°58.4	14.1	5°01.9	11.6	55.7
12	0°46.2	15°40.2	15°31.5	14.1	5°13.5	11.6	55.7
13	15°46.3	15°41.0	30°04.5	14.0	5°25.1	11.6	55.7
14	30°46.3	15°41.7	44°37.5	14.0	5°36.7	11.6	55.7
15	45°46.4	15°42.4	59°10.5	13.9	5°48.2	11.5	55.8
16	60°46.4	15°43.2	73°43.4	13.9	5°59.8	11.5	55.8
17	75°46.5	15°43.9	88°16.2	13.8	6°11.3	11.5	55.8
18	90°46.6	15°44.6	102°49.1	13.8	6°22.8	11.5	55.8
19	105°46.6	15°45.4	117°21.8	13.8	6°34.3	11.5	55.8
20	120°46.7	15°46.1	131°54.6	13.7	6°45.7	11.5	55.9
21	135°46.7	15°46.8	146°27.3	13.7	6°57.2	11.4	55.9
22	150°46.8	15°47.6	160°59.9	13.6	7°08.6	11.4	55.9
23	165°46.9	15°48.3	175°32.5	13.6	7°20.0	11.4	55.9
	SD.=15.9	d=0.7			S.D.=15.1		

Lat.	**Twilight** Naut.	Civil	Sunrise	Sunset	**Twilight** Civil	Naut.
72	–:–	–:–	01:47	22:15	–:–	–:–
70	–:–	–:–	02:27	21:32	–:–	–:–
68	–:–	00:59	02:54	21:03	23:07	–:–
66	–:–	01:51	03:15	20:42	22:08	–:–
64	–:–	02:22	03:31	20:25	21:36	–:–
62	00:52	02:45	03:45	20:11	21:12	23:13
60	01:39	03:03	03:56	19:60	20:54	22:20
58	02:07	03:18	04:06	19:49	20:39	21:50
56	02:28	03:30	04:15	19:41	20:26	21:28
54	02:45	03:41	04:22	19:33	20:15	21:11
52	02:60	03:50	04:29	19:26	20:05	20:56
50	03:12	03:59	04:35	19:20	19:57	20:44
45	03:36	04:16	04:49	19:06	19:39	20:19
40	03:54	04:30	04:59	18:55	19:25	20:01
35	04:09	04:42	05:09	18:46	19:13	19:46
30	04:21	04:51	05:17	18:38	19:03	19:34
20	04:40	05:07	05:31	18:24	18:47	19:14
10	04:55	05:21	05:43	18:12	18:34	18:59
0	05:07	05:32	05:54	18:00	18:22	18:47
-10	05:18	05:43	06:05	17:49	18:11	18:36
-20	05:27	05:53	06:16	17:38	18:00	18:27
-30	05:36	06:05	06:29	17:24	17:49	18:18
-35	05:41	06:11	06:37	17:17	17:43	18:13
-40	05:45	06:17	06:46	17:08	17:36	18:08
-45	05:50	06:25	06:56	16:58	17:29	18:04
-50	05:55	06:33	07:08	16:46	17:20	17:58
-52	05:57	06:37	07:13	16:40	17:16	17:56
-54	05:59	06:41	07:19	16:34	17:12	17:54
-56	06:02	06:46	07:26	16:27	17:07	17:51
-58	06:04	06:51	07:34	16:19	17:02	17:49
-60	06:07	06:57	07:43	16:11	16:56	17:46

Lat.	**Moonrise** Wed	Thu	Fri	**Moonset** Wed	Thu	Fri
72	04:30	04:15	03:59	14:55	16:40	18:30
70	04:23	04:14	04:04	14:60	16:39	18:20
68	04:17	04:12	04:08	15:04	16:37	18:13
66	04:11	04:11	04:11	15:07	16:36	18:06
64	04:07	04:11	04:14	15:10	16:34	18:01
62	04:03	04:10	04:17	15:13	16:34	17:56
60	03:60	04:09	04:19	15:15	16:33	17:52
58	03:57	04:09	04:21	15:17	16:32	17:49
56	03:54	04:08	04:23	15:19	16:31	17:45
54	03:51	04:08	04:24	15:20	16:31	17:43
52	03:49	04:07	04:26	15:22	16:30	17:40
50	03:47	04:07	04:27	15:23	16:30	17:38
45	03:43	04:06	04:30	15:26	16:28	17:33
40	03:39	04:06	04:32	15:28	16:28	17:28
35	03:36	04:05	04:35	15:30	16:27	17:25
30	03:33	04:04	04:36	15:32	16:26	17:22
20	03:28	04:04	04:40	15:35	16:25	17:16
10	03:24	04:03	04:43	15:38	16:24	17:11
0	03:20	04:02	04:45	15:40	16:23	17:07
-10	03:15	04:01	04:48	15:42	16:22	17:02
-20	03:11	04:01	04:51	15:45	16:21	16:57
-30	03:06	03:60	04:55	15:48	16:19	16:52
-35	03:03	03:59	04:57	15:49	16:19	16:49
-40	02:60	03:59	04:59	15:51	16:18	16:45
-45	02:56	03:58	05:02	15:53	16:17	16:41
-50	02:51	03:57	05:05	15:56	16:16	16:36
-52	02:49	03:57	05:06	15:57	16:15	16:34
-54	02:47	03:57	05:08	15:58	16:15	16:31
-56	02:44	03:56	05:10	15:60	16:14	16:29
-58	02:42	03:56	05:12	16:01	16:13	16:26
-60	02:38	03:55	05:14	16:03	16:12	16:22

Day	**Sun** Eqn.of Time 00^h	12^h	Mer. Pass	**Moon** Mer.Pass. Upper	Lower	Age
1	02:48	02:51	11:57	09:29	21:51	26(12%)
2	02:55	02:58	11:57	10:12	22:34	27(6%)
3	03:02	03:05	11:56	10:55	23:18	28(2%)

May 04, 05 ,06 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	221°35.4	206°04.0	4°48.9	140°13.4	24°17.1	318°36.9	-22°38.9	289°28.6	-21°29.2
1	236°37.9	221°03.7	4°50.0	155°14.0	24°17.2	333°39.6	-22°38.9	304°31.0	-21°29.2
2	251°40.4	236°03.3	4°51.2	170°14.7	24°17.3	348°42.2	-22°38.8	319°33.5	-21°29.2
3	266°42.8	251°03.0	4°52.4	185°15.4	24°17.4	3°44.9	-22°38.8	334°36.0	-21°29.2
4	281°45.3	266°02.6	4°53.5	200°16.1	24°17.5	18°47.6	-22°38.8	349°38.5	-21°29.2
5	296°47.8	281°02.3	4°54.7	215°16.8	24°17.6	33°50.2	-22°38.8	4°41.0	-21°29.2
6	311°50.2	296°01.9	4°55.8	230°17.5	24°17.8	48°52.9	-22°38.8	19°43.5	-21°29.2
7	326°52.7	311°01.6	4°57.0	245°18.1	24°17.9	63°55.5	-22°38.8	34°45.9	-21°29.2
8	341°55.2	326°01.2	4°58.1	260°18.8	24°18.0	78°58.2	-22°38.8	49°48.4	-21°29.2
9	356°57.6	341°00.9	4°59.3	275°19.5	24°18.1	94°00.8	-22°38.8	64°50.9	-21°29.2
10	12°00.1	356°00.5	5°00.4	290°20.2	24°18.2	109°03.5	-22°38.8	79°53.4	-21°29.2
11	27°02.5	11°00.2	5°01.6	305°20.9	24°18.3	124°06.1	-22°38.8	94°55.9	-21°29.2
12	42°05.0	25°59.8	5°02.8	320°21.6	24°18.4	139°08.8	-22°38.8	109°58.4	-21°29.2
13	57°07.5	40°59.5	5°03.9	335°22.3	24°18.5	154°11.5	-22°38.8	125°00.8	-21°29.3
14	72°09.9	55°59.1	5°05.1	350°22.9	24°18.6	169°14.1	-22°38.8	140°03.3	-21°29.3
15	87°12.4	70°58.8	5°06.2	5°23.6	24°18.7	184°16.8	-22°38.8	155°05.8	-21°29.3
16	102°14.9	85°58.4	5°07.4	20°24.3	24°18.8	199°19.4	-22°38.7	170°08.3	-21°29.3
17	117°17.3	100°58.1	5°08.5	35°25.0	24°18.9	214°22.1	-22°38.7	185°10.8	-21°29.3
18	132°19.8	115°57.7	5°09.7	50°25.7	24°19.0	229°24.7	-22°38.7	200°13.3	-21°29.3
19	147°22.3	130°57.4	5°10.8	65°26.4	24°19.1	244°27.4	-22°38.7	215°15.7	-21°29.3
20	162°24.7	145°57.0	5°12.0	80°27.0	24°19.2	259°30.1	-22°38.7	230°18.2	-21°29.3
21	177°27.2	160°56.7	5°13.2	95°27.7	24°19.3	274°32.7	-22°38.7	245°20.7	-21°29.3
22	192°29.7	175°56.3	5°14.3	110°28.4	24°19.4	289°35.4	-22°38.7	260°23.2	-21°29.3
23	207°32.1	190°56.0	5°15.5	125°29.1	24°19.5	304°38.0	-22°38.7	275°25.7	-21°29.3
Mer.pass.:9:12:		v-0.3 d1.2 m-3.8		v0.7 d0.1 m1.6		v2.7 d0.0 m-2.3		v2.5 d-0.0 m0.4	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	222°34.6	205°55.6	5°16.6	140°29.8	24°19.6	319°40.7	-22°38.7	290°28.2	-21°29.3
1	237°37.0	220°55.3	5°17.8	155°30.5	24°19.7	334°43.4	-22°38.7	305°30.6	-21°29.3
2	252°39.5	235°54.9	5°18.9	170°31.2	24°19.8	349°46.0	-22°38.7	320°33.1	-21°29.3
3	267°42.0	250°54.6	5°20.1	185°31.8	24°19.9	4°48.7	-22°38.7	335°35.6	-21°29.3
4	282°44.4	265°54.2	5°21.2	200°32.5	24°20.0	19°51.3	-22°38.7	350°38.1	-21°29.3
5	297°46.9	280°53.8	5°22.4	215°33.2	24°20.1	34°54.0	-22°38.6	5°40.6	-21°29.3
6	312°49.4	295°53.5	5°23.5	230°33.9	24°20.1	49°56.7	-22°38.6	20°43.1	-21°29.3
7	327°51.8	310°53.1	5°24.7	245°34.6	24°20.2	64°59.3	-22°38.6	35°45.6	-21°29.3
8	342°54.3	325°52.8	5°25.8	260°35.3	24°20.3	80°02.0	-22°38.6	50°48.1	-21°29.3
9	357°56.8	340°52.4	5°27.0	275°35.9	24°20.4	95°04.7	-22°38.6	65°50.5	-21°29.3
10	12°59.2	355°52.1	5°28.2	290°36.6	24°20.5	110°07.3	-22°38.6	80°53.0	-21°29.4
11	28°01.7	10°51.7	5°29.3	305°37.3	24°20.6	125°10.0	-22°38.6	95°55.5	-21°29.4
12	43°04.1	25°51.4	5°30.5	320°38.0	24°20.7	140°12.7	-22°38.6	110°58.0	-21°29.4
13	58°06.6	40°51.0	5°31.6	335°38.7	24°20.8	155°15.3	-22°38.6	126°00.5	-21°29.4
14	73°09.1	55°50.7	5°32.8	350°39.4	24°20.9	170°18.0	-22°38.6	141°03.0	-21°29.4
15	88°11.5	70°50.3	5°33.9	5°40.1	24°21.0	185°20.6	-22°38.6	156°05.5	-21°29.4
16	103°14.0	85°50.0	5°35.1	20°40.7	24°21.1	200°23.3	-22°38.6	171°07.9	-21°29.4
17	118°16.5	100°49.6	5°36.2	35°41.4	24°21.2	215°26.0	-22°38.6	186°10.4	-21°29.4
18	133°18.9	115°49.2	5°37.4	50°42.1	24°21.3	230°28.6	-22°38.5	201°12.9	-21°29.4
19	148°21.4	130°48.9	5°38.5	65°42.8	24°21.4	245°31.3	-22°38.5	216°15.4	-21°29.4
20	163°23.9	145°48.5	5°39.7	80°43.5	24°21.5	260°34.0	-22°38.5	231°17.9	-21°29.4
21	178°26.3	160°48.2	5°40.8	95°44.2	24°21.5	275°36.6	-22°38.5	246°20.4	-21°29.4
22	193°28.8	175°47.8	5°42.0	110°44.8	24°21.6	290°39.3	-22°38.5	261°22.9	-21°29.4
23	208°31.3	190°47.5	5°43.1	125°45.5	24°21.7	305°42.0	-22°38.5	276°25.4	-21°29.4
Mer.pass.:9:08:		v-0.4 d1.2 m-3.8		v0.7 d0.1 m1.6		v2.7 d0.0 m-2.3		v2.5 d-0.0 m0.4	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	223°33.7	205°47.1	5°44.3	140°46.2	24°21.8	320°44.6	-22°38.5	291°27.9	-21°29.4
1	238°36.2	220°46.8	5°45.4	155°46.9	24°21.9	335°47.3	-22°38.5	306°30.4	-21°29.4
2	253°38.6	235°46.4	5°46.6	170°47.6	24°22.0	350°50.0	-22°38.5	321°32.8	-21°29.4
3	268°41.1	250°46.0	5°47.7	185°48.3	24°22.1	5°52.6	-22°38.5	336°35.3	-21°29.4
4	283°43.6	265°45.7	5°48.9	200°48.9	24°22.2	20°55.3	-22°38.5	351°37.8	-21°29.4
5	298°46.0	280°45.3	5°50.0	215°49.6	24°22.3	35°58.0	-22°38.5	6°40.3	-21°29.5
6	313°48.5	295°45.0	5°51.2	230°50.3	24°22.3	51°00.7	-22°38.4	21°42.8	-21°29.5
7	328°51.0	310°44.6	5°52.3	245°51.0	24°22.4	66°03.3	-22°38.4	36°45.3	-21°29.5
8	343°53.4	325°44.3	5°53.5	260°51.7	24°22.5	81°06.0	-22°38.4	51°47.8	-21°29.5
9	358°55.9	340°43.9	5°54.6	275°52.4	24°22.6	96°08.7	-22°38.4	66°50.3	-21°29.5
10	13°58.4	355°43.5	5°55.8	290°53.1	24°22.7	111°11.3	-22°38.4	81°52.8	-21°29.5
11	29°00.8	10°43.2	5°56.9	305°53.7	24°22.8	126°14.0	-22°38.4	96°55.3	-21°29.5
12	44°03.3	25°42.8	5°58.1	320°54.4	24°22.9	141°16.7	-22°38.4	111°57.7	-21°29.5
13	59°05.8	40°42.5	5°59.2	335°55.1	24°23.0	156°19.4	-22°38.4	127°00.2	-21°29.5
14	74°08.2	55°42.1	6°00.4	350°55.8	24°23.0	171°22.0	-22°38.4	142°02.7	-21°29.5
15	89°10.7	70°41.7	6°01.5	5°56.5	24°23.1	186°24.7	-22°38.4	157°05.2	-21°29.5
16	104°13.1	85°41.4	6°02.6	20°57.2	24°23.2	201°27.4	-22°38.4	172°07.7	-21°29.5
17	119°15.6	100°41.0	6°03.8	35°57.8	24°23.3	216°30.0	-22°38.4	187°10.2	-21°29.5
18	134°18.1	115°40.7	6°04.9	50°58.5	24°23.4	231°32.7	-22°38.4	202°12.7	-21°29.5
19	149°20.5	130°40.3	6°06.1	65°59.2	24°23.5	246°35.4	-22°38.3	217°15.2	-21°29.5
20	164°23.0	145°39.9	6°07.2	80°59.9	24°23.5	261°38.1	-22°38.3	232°17.7	-21°29.5
21	179°25.5	160°39.6	6°08.4	96°00.6	24°23.6	276°40.7	-22°38.3	247°20.2	-21°29.5
22	194°27.9	175°39.2	6°09.5	111°01.3	24°23.7	291°43.4	-22°38.3	262°22.7	-21°29.6
23	209°30.4	190°38.9	6°10.7	126°02.0	24°23.8	306°46.1	-22°38.3	277°25.2	-21°29.6
Mer.pass.:9:04:		v-0.4 d1.1 m-3.8		v0.7 d0.1 m1.6		v2.7 d0.0 m-2.3		v2.5 d-0.0 m0.4	

Stars

	SHA	Dec
Alpheratz	357°39.7	29°11.5
Ankaa	353°12.1	-42°12.1
Schedar	349°36.5	56°38.3
Diphda	348°52.1	-17°53.0
Achernar	335°24.4	-57°08.4
Hamal	327°56.6	23°33.0
Polaris	316°30.3	89°20.6
Akamar	315°15.7	-40°13.9
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.6
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.7	-52°42.7
Sirius	258°30.3	-16°44.7
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.8
Avior	234°16.5	-59°34.6
Suhail	222°49.5	-43°30.9
Miaplacidus	221°38.8	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.1	11°52.4
Dubhe	193°46.4	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.3	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.2
Hadar	148°41.6	-60°27.9
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.8
Zubenelg.	137°00.7	-16°07.2
Kochab	137°18.9	74°04.7
Alphecca	126°07.3	26°39.1
Antares	112°21.0	-26°28.3
Atria	107°18.8	-69°03.4
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°06.8
Rasalhague	96°02.5	12°32.8
Etamin	90°43.9	51°29.1
Kaus Aust.	83°38.3	-34°22.3
Vega	80°36.0	38°47.9
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.0
Peacock	53°12.9	-56°40.1
Deneb	49°28.7	45°20.7
Enif	33°43.3	9°57.6
Alnair	27°38.9	-46°51.9
Fomalhaut	15°19.8	-29°31.2
Scheat	13°49.7	28°10.9
Markab	13°34.6	15°18.3

2019/5/4	SHA	Mer.pass
Venus	344°28.6	10:16
Mars	278°37.9	14:38
Jupiter	97°01.5	02:45
Saturn	67°53.1	04:41

2019/5/5	SHA	Mer.pass
Venus	343°21.0	10:17
Mars	277°55.2	14:37
Jupiter	97°06.1	02:41
Saturn	67°53.6	04:37

2019/5/6	SHA	Mer.pass
Venus	342°13.4	10:17
Mars	277°12.5	14:36
Jupiter	97°10.9	02:37
Saturn	67°54.1	04:33

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°46.9	15°49.0	190°05.0	13.5	7°31.4	11.4	56.0
1	195°47.0	15°49.7	204°37.5	13.5	7°42.8	11.3	56.0
2	210°47.1	15°50.5	219°09.9	13.4	7°54.1	11.3	56.0
3	225°47.1	15°51.2	233°42.3	13.3	8°05.4	11.3	56.0
4	240°47.2	15°51.9	248°14.6	13.3	8°16.7	11.3	56.0
5	255°47.2	15°52.7	262°46.9	13.2	8°27.9	11.2	56.1
6	270°47.3	15°53.4	277°19.1	13.2	8°39.1	11.2	56.1
7	285°47.4	15°54.1	291°51.2	13.1	8°50.3	11.2	56.1
8	300°47.4	15°54.8	306°23.3	13.1	9°01.5	11.1	56.1
9	315°47.5	15°55.6	320°55.4	13.0	9°12.6	11.1	56.2
10	330°47.5	15°56.3	335°27.4	13.0	9°23.7	11.1	56.2
11	345°47.6	15°57.0	349°59.3	12.9	9°34.8	11.0	56.2
12	0°47.6	15°57.7	4°31.2	12.8	9°45.8	11.0	56.2
13	15°47.7	15°58.5	19°03.0	12.8	9°56.8	11.0	56.2
14	30°47.8	15°59.2	33°34.7	12.7	10°07.8	10.9	56.3
15	45°47.8	15°59.9	48°06.4	12.7	10°18.7	10.9	56.3
16	60°47.9	16°00.6	62°38.1	12.6	10°29.5	10.9	56.3
17	75°47.9	16°01.4	77°09.6	12.5	10°40.4	10.8	56.3
18	90°48.0	16°02.1	91°41.2	12.5	10°51.2	10.8	56.4
19	105°48.0	16°02.8	106°12.6	12.4	11°01.9	10.7	56.4
20	120°48.1	16°03.5	120°44.0	12.4	11°12.6	10.7	56.4
21	135°48.2	16°04.2	135°15.3	12.3	11°23.3	10.6	56.4
22	150°48.2	16°05.0	149°46.6	12.2	11°33.9	10.6	56.5
23	165°48.3	16°05.7	164°17.8	12.2	11°44.5	10.5	56.5
	SD.=15.9	d=0.7			S.D.=15.3		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°48.3	16°06.4	178°48.9	12.1	11°55.0	10.5	56.5
1	195°48.4	16°07.1	193°19.9	12.0	12°05.5	10.5	56.5
2	210°48.4	16°07.8	207°50.9	12.0	12°15.9	10.4	56.5
3	225°48.5	16°08.6	222°21.9	11.9	12°26.3	10.3	56.6
4	240°48.5	16°09.3	236°52.7	11.8	12°36.6	10.3	56.6
5	255°48.6	16°10.0	251°23.5	11.8	12°46.9	10.2	56.6
6	270°48.6	16°10.7	265°54.2	11.7	12°57.1	10.2	56.6
7	285°48.7	16°11.4	280°24.9	11.6	13°07.3	10.1	56.7
8	300°48.7	16°12.1	294°55.5	11.6	13°17.4	10.1	56.7
9	315°48.8	16°12.9	309°26.0	11.5	13°27.4	10.0	56.7
10	330°48.9	16°13.6	323°56.5	11.4	13°37.4	10.0	56.7
11	345°48.9	16°14.3	338°26.8	11.3	13°47.3	9.9	56.8
12	0°49.0	16°15.0	352°57.1	11.3	13°57.2	9.8	56.8
13	15°49.0	16°15.7	7°27.4	11.2	14°07.0	9.8	56.8
14	30°49.1	16°16.4	21°57.5	11.1	14°16.7	9.7	56.8
15	45°49.1	16°17.1	36°27.6	11.1	14°26.4	9.6	56.8
16	60°49.2	16°17.9	50°57.7	11.0	14°36.0	9.6	56.9
17	75°49.2	16°18.6	65°27.6	10.9	14°45.5	9.5	56.9
18	90°49.3	16°19.3	79°57.5	10.8	14°55.0	9.4	56.9
19	105°49.3	16°20.0	94°27.3	10.8	15°04.4	9.4	56.9
20	120°49.4	16°20.7	108°57.0	10.7	15°13.7	9.3	57.0
21	135°49.4	16°21.4	123°26.7	10.6	15°23.0	9.2	57.0
22	150°49.5	16°22.1	137°56.3	10.6	15°32.2	9.1	57.0
23	165°49.5	16°22.8	152°25.8	10.5	15°41.3	9.1	57.0
	SD.=15.9	d=0.7			S.D.=15.4		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°49.6	16°23.5	166°55.3	10.4	15°50.3	9.0	57.0
1	195°49.6	16°24.2	181°24.6	10.3	15°59.3	8.9	57.1
2	210°49.7	16°24.9	195°53.9	10.3	16°08.2	8.8	57.1
3	225°49.7	16°25.7	210°23.1	10.2	16°17.0	8.8	57.1
4	240°49.8	16°26.4	224°52.3	10.1	16°25.7	8.7	57.1
5	255°49.8	16°27.1	239°21.4	10.0	16°34.3	8.6	57.2
6	270°49.9	16°27.8	253°50.4	10.0	16°42.9	8.5	57.2
7	285°49.9	16°28.5	268°19.3	9.9	16°51.4	8.4	57.2
8	300°49.9	16°29.2	282°48.2	9.8	16°59.8	8.3	57.2
9	315°50.0	16°29.9	297°16.9	9.7	17°08.1	8.3	57.2
10	330°50.0	16°30.6	311°45.6	9.7	17°16.3	8.2	57.3
11	345°50.1	16°31.3	326°14.3	9.6	17°24.4	8.1	57.3
12	0°50.1	16°32.0	340°42.8	9.5	17°32.5	8.0	57.3
13	15°50.2	16°32.7	355°11.3	9.4	17°40.4	7.9	57.3
14	30°50.2	16°33.4	9°39.7	9.4	17°48.3	7.8	57.3
15	45°50.3	16°34.1	24°08.1	9.3	17°56.0	7.7	57.4
16	60°50.3	16°34.8	38°36.3	9.2	18°03.7	7.6	57.4
17	75°50.4	16°35.5	53°04.5	9.2	18°11.3	7.5	57.4
18	90°50.4	16°36.2	67°32.7	9.1	18°18.8	7.4	57.4
19	105°50.4	16°36.9	82°00.7	9.0	18°26.2	7.3	57.4
20	120°50.5	16°37.6	96°28.7	8.9	18°33.5	7.2	57.5
21	135°50.5	16°38.3	110°56.6	8.9	18°40.6	7.1	57.5
22	150°50.6	16°39.0	125°24.4	8.8	18°47.7	7.0	57.5
23	165°50.6	16°39.7	139°52.2	8.7	18°54.7	6.9	57.5
	SD.=15.9	d=0.7			S.D.=15.6		

Lat.	**Twilight**					**Twilight**
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	01:18	22:46	–:–	–:–
70	–:–	–:–	02:09	21:50	–:–	–:–
68	–:–	–:–	02:40	21:17	–:–	–:–
66	–:–	01:31	03:03	20:53	22:29	–:–
64	–:–	02:08	03:21	20:35	21:50	–:–
62	–:–	02:33	03:36	20:20	21:23	–:–
60	01:21	02:53	03:48	20:07	21:03	22:38
58	01:54	03:09	03:59	19:56	20:47	22:03
56	02:18	03:22	04:08	19:47	20:33	21:38
54	02:37	03:34	04:16	19:38	20:21	21:19
52	02:52	03:44	04:24	19:31	20:11	21:03
50	03:05	03:53	04:30	19:24	20:02	20:50
45	03:31	04:11	04:44	19:10	19:43	20:24
40	03:50	04:26	04:56	18:58	19:28	20:04
35	04:05	04:38	05:06	18:48	19:16	19:49
30	04:18	04:49	05:14	18:40	19:05	19:36
20	04:38	05:06	05:29	18:25	18:48	19:16
10	04:54	05:20	05:42	18:12	18:34	18:60
0	05:07	05:32	05:53	18:00	18:22	18:47
-10	05:18	05:43	06:05	17:48	18:10	18:35
-20	05:28	05:54	06:17	17:36	17:59	18:25
-30	05:38	06:06	06:31	17:22	17:47	18:15
-35	05:43	06:13	06:39	17:14	17:40	18:10
-40	05:48	06:20	06:49	17:05	17:33	18:05
-45	05:53	06:28	06:59	16:54	17:25	17:60
-50	05:59	06:37	07:12	16:41	17:15	17:54
-52	06:01	06:42	07:18	16:35	17:11	17:51
-54	06:04	06:46	07:25	16:28	17:06	17:49
-56	06:07	06:51	07:32	16:21	17:01	17:46
-58	06:10	06:57	07:40	16:12	16:56	17:43
-60	06:13	07:03	07:50	16:03	16:50	17:40

Lat.	**Moonrise**			**Moonset**		
	Sat	Sun	Mon	Sat	Sun	Mon
72	03:42	03:21	02:47	20:28	22:45	–:–
70	03:54	03:43	03:27	20:08	22:06	–:–
68	04:04	03:60	03:55	19:53	21:39	23:32
66	04:12	04:13	04:16	19:40	21:19	22:60
64	04:19	04:25	04:33	19:30	21:02	22:36
62	04:25	04:34	04:48	19:21	20:49	22:17
60	04:30	04:43	04:60	19:14	20:38	22:02
58	04:34	04:50	05:10	19:07	20:28	21:49
56	04:38	04:57	05:19	19:02	20:19	21:37
54	04:42	05:03	05:27	18:56	20:12	21:27
52	04:45	05:08	05:35	18:52	20:05	21:19
50	04:49	05:13	05:41	18:48	19:59	21:11
45	04:55	05:23	05:55	18:39	19:46	20:54
40	05:01	05:32	06:07	18:31	19:35	20:41
35	05:06	05:39	06:17	18:25	19:26	20:29
30	05:10	05:46	06:26	18:19	19:18	20:19
20	05:17	05:58	06:41	18:09	19:04	20:02
10	05:24	06:08	06:55	18:01	18:52	19:47
0	05:30	06:17	07:08	17:53	18:41	19:33
-10	05:37	06:27	07:20	17:45	18:30	19:19
-20	05:43	06:37	07:34	17:36	18:18	19:04
-30	05:51	06:49	07:50	17:26	18:04	18:47
-35	05:56	06:56	07:59	17:21	17:56	18:37
-40	06:01	07:04	08:09	17:15	17:48	18:25
-45	06:07	07:14	08:22	17:07	17:37	18:12
-50	06:14	07:25	08:37	16:59	17:25	17:56
-52	06:17	07:30	08:44	16:55	17:19	17:48
-54	06:21	07:36	08:52	16:50	17:12	17:40
-56	06:25	07:42	09:01	16:45	17:05	17:31
-58	06:30	07:50	09:11	16:40	16:57	17:20
-60	06:35	07:58	09:22	16:34	16:48	17:08

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	03:08	03:11	11:56	11:41	00:04	29(0%)
5	03:13	03:16	11:56	12:29	00:04	1(0%)
6	03:18	03:21	11:56	13:19	00:54	2(3%)

May 07, 08 ,09 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	224°32.9	205°38.5	6°11.8	141°02.6	24°23.9	321°48.8	-22°38.3	292°27.7	-21°29.6
1	239°35.3	220°38.1	6°13.0	156°03.3	24°23.9	336°51.4	-22°38.3	307°30.2	-21°29.6
2	254°37.8	235°37.8	6°14.1	171°04.0	24°24.0	351°54.1	-22°38.3	322°32.6	-21°29.6
3	269°40.2	250°37.4	6°15.3	186°04.7	24°24.1	6°56.8	-22°38.3	337°35.1	-21°29.6
4	284°42.7	265°37.1	6°16.4	201°05.4	24°24.2	21°59.5	-22°38.3	352°37.6	-21°29.6
5	299°45.2	280°36.7	6°17.5	216°06.1	24°24.3	37°02.1	-22°38.3	7°40.1	-21°29.6
6	314°47.6	295°36.3	6°18.7	231°06.7	24°24.4	52°04.8	-22°38.3	22°42.6	-21°29.6
7	329°50.1	310°36.0	6°19.8	246°07.4	24°24.4	67°07.5	-22°38.2	37°45.1	-21°29.6
8	344°52.6	325°35.6	6°21.0	261°08.1	24°24.5	82°10.2	-22°38.2	52°47.6	-21°29.6
9	359°55.0	340°35.2	6°22.1	276°08.8	24°24.6	97°12.8	-22°38.2	67°50.1	-21°29.6
10	14°57.5	355°34.9	6°23.3	291°09.5	24°24.7	112°15.5	-22°38.2	82°52.6	-21°29.6
11	29°60.0	10°34.5	6°24.4	306°10.2	24°24.7	127°18.2	-22°38.2	97°55.1	-21°29.6
12	45°02.4	25°34.2	6°25.6	321°10.8	24°24.8	142°20.9	-22°38.2	112°57.6	-21°29.6
13	60°04.9	40°33.8	6°26.7	336°11.5	24°24.9	157°23.6	-22°38.2	128°00.1	-21°29.6
14	75°07.4	55°33.4	6°27.8	351°12.2	24°25.0	172°26.2	-22°38.2	143°02.6	-21°29.7
15	90°09.8	70°33.1	6°29.0	6°12.9	24°25.1	187°28.9	-22°38.2	158°05.1	-21°29.7
16	105°12.3	85°32.7	6°30.1	21°13.6	24°25.1	202°31.6	-22°38.2	173°07.6	-21°29.7
17	120°14.7	100°32.3	6°31.3	36°14.3	24°25.2	217°34.3	-22°38.2	188°10.1	-21°29.7
18	135°17.2	115°32.0	6°32.4	51°15.0	24°25.3	232°37.0	-22°38.1	203°12.6	-21°29.7
19	150°19.7	130°31.6	6°33.5	66°15.6	24°25.4	247°39.6	-22°38.1	218°15.1	-21°29.7
20	165°22.1	145°31.2	6°34.7	81°16.3	24°25.4	262°42.3	-22°38.1	233°17.6	-21°29.7
21	180°24.6	160°30.9	6°35.8	96°17.0	24°25.5	277°45.0	-22°38.1	248°20.1	-21°29.7
22	195°27.1	175°30.5	6°37.0	111°17.7	24°25.6	292°47.7	-22°38.1	263°22.6	-21°29.7
23	210°29.5	190°30.2	6°38.1	126°18.4	24°25.6	307°50.4	-22°38.1	278°25.1	-21°29.7
Mer.pass.:9:00:		v-0.4 d1.1 m-3.8		v0.7 d0.1 m1.7		v2.7 d0.0 m-2.3		v2.5 d-0.0 m0.4	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	225°32.0	205°29.8	6°39.3	141°19.1	24°25.7	322°53.0	-22°38.1	293°27.6	-21°29.7
1	240°34.5	220°29.4	6°40.4	156°19.7	24°25.8	337°55.7	-22°38.1	308°30.1	-21°29.7
2	255°36.9	235°29.1	6°41.5	171°20.4	24°25.9	352°58.4	-22°38.1	323°32.6	-21°29.7
3	270°39.4	250°28.7	6°42.7	186°21.1	24°25.9	8°01.1	-22°38.1	338°35.1	-21°29.7
4	285°41.9	265°28.3	6°43.8	201°21.8	24°26.0	23°03.8	-22°38.1	353°37.6	-21°29.7
5	300°44.3	280°28.0	6°45.0	216°22.5	24°26.1	38°06.4	-22°38.1	8°40.1	-21°29.7
6	315°46.8	295°27.6	6°46.1	231°23.2	24°26.2	53°09.1	-22°38.0	23°42.6	-21°29.8
7	330°49.2	310°27.2	6°47.2	246°23.8	24°26.2	68°11.8	-22°38.0	38°45.1	-21°29.8
8	345°51.7	325°26.9	6°48.4	261°24.5	24°26.3	83°14.5	-22°38.0	53°47.6	-21°29.8
9	0°54.2	340°26.5	6°49.5	276°25.2	24°26.4	98°17.2	-22°38.0	68°50.1	-21°29.8
10	15°56.6	355°26.1	6°50.6	291°25.9	24°26.4	113°19.9	-22°38.0	83°52.6	-21°29.8
11	30°59.1	10°25.8	6°51.8	306°26.6	24°26.5	128°22.6	-22°38.0	98°55.1	-21°29.8
12	46°01.6	25°25.4	6°52.9	321°27.3	24°26.6	143°25.2	-22°38.0	113°57.6	-21°29.8
13	61°04.0	40°25.0	6°54.1	336°28.0	24°26.6	158°27.9	-22°38.0	129°00.1	-21°29.8
14	76°06.5	55°24.6	6°55.2	351°28.6	24°26.7	173°30.6	-22°38.0	144°02.6	-21°29.8
15	91°09.0	70°24.3	6°56.3	6°29.3	24°26.8	188°33.3	-22°38.0	159°05.1	-21°29.8
16	106°11.4	85°23.9	6°57.5	21°30.0	24°26.9	203°36.0	-22°38.0	174°07.6	-21°29.8
17	121°13.9	100°23.5	6°58.6	36°30.7	24°26.9	218°38.7	-22°37.9	189°10.1	-21°29.8
18	136°16.4	115°23.2	6°59.7	51°31.4	24°27.0	233°41.4	-22°37.9	204°12.6	-21°29.8
19	151°18.8	130°22.8	7°00.9	66°32.1	24°27.1	248°44.0	-22°37.9	219°15.1	-21°29.8
20	166°21.3	145°22.4	7°02.0	81°32.7	24°27.1	263°46.7	-22°37.9	234°17.6	-21°29.9
21	181°23.7	160°22.1	7°03.2	96°33.4	24°27.2	278°49.4	-22°37.9	249°20.1	-21°29.9
22	196°26.2	175°21.7	7°04.3	111°34.1	24°27.3	293°52.1	-22°37.9	264°22.6	-21°29.9
23	211°28.7	190°21.3	7°05.4	126°34.8	24°27.3	308°54.8	-22°37.9	279°25.1	-21°29.9
Mer.pass.:8:56:		v-0.4 d1.1 m-3.8		v0.7 d0.1 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	226°31.1	205°21.0	7°06.6	141°35.5	24°27.4	323°57.5	-22°37.9	294°27.6	-21°29.9
1	241°33.6	220°20.6	7°07.7	156°36.2	24°27.4	339°00.2	-22°37.9	309°30.1	-21°29.9
2	256°36.1	235°20.2	7°08.8	171°36.9	24°27.5	354°02.9	-22°37.9	324°32.6	-21°29.9
3	271°38.5	250°19.8	7°10.0	186°37.5	24°27.6	9°05.5	-22°37.9	339°35.1	-21°29.9
4	286°41.0	265°19.5	7°11.1	201°38.2	24°27.6	24°08.2	-22°37.8	354°37.6	-21°29.9
5	301°43.5	280°19.1	7°12.2	216°38.9	24°27.7	39°10.9	-22°37.8	9°40.1	-21°29.9
6	316°45.9	295°18.7	7°13.4	231°39.6	24°27.8	54°13.6	-22°37.8	24°42.6	-21°29.9
7	331°48.4	310°18.3	7°14.5	246°40.3	24°27.8	69°16.3	-22°37.8	39°45.1	-21°29.9
8	346°50.9	325°18.0	7°15.6	261°41.0	24°27.9	84°19.0	-22°37.8	54°47.6	-21°29.9
9	1°53.3	340°17.6	7°16.8	276°41.6	24°28.0	99°21.7	-22°37.8	69°50.1	-21°29.9
10	16°55.8	355°17.2	7°17.9	291°42.3	24°28.0	114°24.4	-22°37.8	84°52.6	-21°30.0
11	31°58.2	10°16.9	7°19.0	306°43.0	24°28.1	129°27.1	-22°37.8	99°55.1	-21°30.0
12	47°00.7	25°16.5	7°20.2	321°43.7	24°28.1	144°29.8	-22°37.8	114°57.6	-21°30.0
13	62°03.2	40°16.1	7°21.3	336°44.4	24°28.2	159°32.5	-22°37.8	130°00.1	-21°30.0
14	77°05.6	55°15.7	7°22.4	351°45.1	24°28.3	174°35.1	-22°37.8	145°02.6	-21°30.0
15	92°08.1	70°15.4	7°23.6	6°45.7	24°28.3	189°37.8	-22°37.7	160°05.1	-21°30.0
16	107°10.6	85°15.0	7°24.7	21°46.4	24°28.4	204°40.5	-22°37.7	175°07.6	-21°30.0
17	122°13.0	100°14.6	7°25.8	36°47.1	24°28.4	219°43.2	-22°37.7	190°10.1	-21°30.0
18	137°15.5	115°14.2	7°27.0	51°47.8	24°28.5	234°45.9	-22°37.7	205°12.6	-21°30.0
19	152°18.0	130°13.9	7°28.1	66°48.5	24°28.6	249°48.6	-22°37.7	220°15.1	-21°30.0
20	167°20.4	145°13.5	7°29.2	81°49.2	24°28.6	264°51.3	-22°37.7	235°17.7	-21°30.0
21	182°22.9	160°13.1	7°30.3	96°49.9	24°28.7	279°54.0	-22°37.7	250°20.2	-21°30.0
22	197°25.3	175°12.7	7°31.5	111°50.5	24°28.7	294°56.7	-22°37.7	265°22.7	-21°30.0
23	212°27.8	190°12.4	7°32.6	126°51.2	24°28.8	309°59.4	-22°37.7	280°25.2	-21°30.1
Mer.pass.:8:52:		v-0.4 d1.1 m-3.8		v0.7 d0.1 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.1	-42°12.1
Schedar	349°36.4	56°38.3
Diphda	348°52.1	-17°53.0
Achernar	335°24.4	-57°08.4
Hamal	327°56.6	23°33.0
Polaris	316°30.0	89°20.6
Akamar	315°15.7	-40°13.9
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.7	-52°42.7
Sirius	258°30.3	-16°44.7
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.7
Avior	234°16.6	-59°34.6
Suhail	222°49.5	-43°30.9
Miaplacidus	221°38.9	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.5	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.3	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.2
Hadar	148°41.6	-60°27.9
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.8
Zubenelg.	137°00.7	-16°07.2
Kochab	137°18.9	74°04.7
Alphecca	126°07.3	26°39.1
Antares	112°21.0	-26°28.3
Atria	107°18.7	-69°03.4
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°06.8
Rasalhague	96°02.5	12°32.8
Etamin	90°43.9	51°29.1
Kaus Aust.	83°38.2	-34°22.3
Vega	80°36.0	38°47.9
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.0
Peacock	53°12.8	-56°40.1
Deneb	49°28.7	45°20.7
Enif	33°43.3	9°57.7
Alnair	27°38.9	-46°51.9
Fomalhaut	15°19.8	-29°31.2
Scheat	13°49.7	28°10.9
Markab	13°34.5	15°18.3

2019/5/7	**SHA**	**Mer.pass**
Venus	341°05.6	10:18
Mars	276°29.8	14:35
Jupiter	97°15.9	02:32
Saturn	67°54.8	04:29

2019/5/8	**SHA**	**Mer.pass**
Venus	339°57.8	10:18
Mars	275°47.1	14:34
Jupiter	97°21.0	02:28
Saturn	67°55.6	04:25

2019/5/9	**SHA**	**Mer.pass**
Venus	338°49.8	10:19
Mars	275°04.3	14:33
Jupiter	97°26.3	02:24
Saturn	67°56.4	04:21

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
Tue							
0	180°50.7	16°40.4	154°19.9	8.7	19°01.6	6.8	57.6
1	195°50.7	16°41.1	168°47.5	8.6	19°08.4	6.7	57.6
2	210°50.8	16°41.8	183°15.1	8.5	19°15.1	6.6	57.6
3	225°50.8	16°42.5	197°42.5	8.4	19°21.6	6.5	57.6
4	240°50.8	16°43.2	212°10.0	8.4	19°28.1	6.4	57.6
5	255°50.9	16°43.9	226°37.3	8.3	19°34.4	6.3	57.7
6	270°50.9	16°44.5	241°04.6	8.2	19°40.7	6.2	57.7
7	285°51.0	16°45.2	255°31.8	8.2	19°46.8	6.1	57.7
8	300°51.0	16°45.9	269°58.9	8.1	19°52.8	6.0	57.7
9	315°51.0	16°46.6	284°26.0	8.0	19°58.7	5.9	57.7
10	330°51.1	16°47.3	298°53.0	8.0	20°04.5	5.7	57.7
11	345°51.1	16°48.0	313°20.0	7.9	20°10.2	5.6	57.8
12	0°51.2	16°48.7	327°46.9	7.9	20°15.8	5.5	57.8
13	15°51.2	16°49.4	342°13.7	7.8	20°21.2	5.4	57.8
14	30°51.2	16°50.1	356°40.4	7.7	20°26.6	5.3	57.8
15	45°51.3	16°50.8	11°07.1	7.7	20°31.8	5.2	57.8
16	60°51.3	16°51.5	25°33.8	7.6	20°36.9	5.0	57.9
17	75°51.4	16°52.1	40°00.4	7.5	20°41.9	4.9	57.9
18	90°51.4	16°52.8	54°26.9	7.5	20°46.7	4.8	57.9
19	105°51.4	16°53.5	68°53.3	7.4	20°51.5	4.7	57.9
20	120°51.5	16°54.2	83°19.7	7.4	20°56.1	4.6	57.9
21	135°51.5	16°54.9	97°46.1	7.3	21°00.6	4.4	58.0
22	150°51.6	16°55.6	112°12.4	7.3	21°04.9	4.3	58.0
23	165°51.6	16°56.3	126°38.6	7.2	21°09.2	4.2	58.0
	SD.=15.9	d=0.7			S.D.=15.7		

h	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
Wed							
0	180°51.6	16°56.9	141°04.8	7.2	21°13.3	4.0	58.0
1	195°51.7	16°57.6	155°30.9	7.1	21°17.3	3.9	58.0
2	210°51.7	16°58.3	169°57.0	7.0	21°21.1	3.8	58.0
3	225°51.7	16°59.0	184°23.0	7.0	21°24.9	3.7	58.1
4	240°51.8	16°59.7	198°49.0	6.9	21°28.5	3.5	58.1
5	255°51.8	17°00.4	213°14.9	6.9	21°31.9	3.4	58.1
6	270°51.9	17°01.0	227°40.8	6.9	21°35.3	3.3	58.1
7	285°51.9	17°01.7	242°06.6	6.8	21°38.5	3.1	58.1
8	300°51.9	17°02.4	256°32.4	6.8	21°41.5	3.0	58.2
9	315°52.0	17°03.1	270°58.1	6.7	21°44.5	2.9	58.2
10	330°52.0	17°03.8	285°23.8	6.7	21°47.3	2.7	58.2
11	345°52.0	17°04.5	299°49.5	6.6	21°50.0	2.6	58.2
12	0°52.1	17°05.1	314°15.1	6.6	21°52.5	2.5	58.2
13	15°52.1	17°05.8	328°40.6	6.6	21°54.9	2.3	58.2
14	30°52.1	17°06.5	343°06.2	6.5	21°57.2	2.2	58.3
15	45°52.2	17°07.2	357°31.7	6.5	21°59.3	2.1	58.3
16	60°52.2	17°07.8	11°57.1	6.4	22°01.3	1.9	58.3
17	75°52.2	17°08.5	26°22.5	6.4	22°03.2	1.8	58.3
18	90°52.3	17°09.2	40°47.9	6.4	22°04.9	1.7	58.3
19	105°52.3	17°09.9	55°13.3	6.3	22°06.5	1.5	58.3
20	120°52.3	17°10.5	69°38.6	6.3	22°07.9	1.4	58.4
21	135°52.4	17°11.2	84°03.9	6.3	22°09.2	1.2	58.4
22	150°52.4	17°11.9	98°29.2	6.3	22°10.4	1.1	58.4
23	165°52.4	17°12.6	112°54.4	6.2	22°11.4	1.0	58.4
	SD.=15.8	d=0.7			S.D.=15.8		

h	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
Thu							
0	180°52.5	17°13.2	127°19.7	6.2	22°12.3	0.8	58.4
1	195°52.5	17°13.9	141°44.8	6.2	22°13.1	0.7	58.4
2	210°52.5	17°14.6	156°10.0	6.2	22°13.7	0.5	58.4
3	225°52.6	17°15.3	170°35.2	6.1	22°14.1	0.4	58.5
4	240°52.6	17°15.9	185°00.3	6.1	22°14.5	0.3	58.5
5	255°52.6	17°16.6	199°25.4	6.1	22°14.6	0.1	58.5
6	270°52.6	17°17.3	213°50.5	6.1	22°14.7	-0.0	58.5
7	285°52.7	17°17.9	228°15.6	6.1	22°14.6	-0.2	58.5
8	300°52.7	17°18.6	242°40.6	6.1	22°14.3	-0.3	58.5
9	315°52.7	17°19.3	257°05.7	6.0	22°13.9	-0.5	58.6
10	330°52.8	17°19.9	271°30.7	6.0	22°13.4	-0.6	58.6
11	345°52.8	17°20.6	285°55.7	6.0	22°12.7	-0.7	58.6
12	0°52.8	17°21.3	300°20.8	6.0	22°11.9	-0.9	58.6
13	15°52.9	17°21.9	314°45.8	6.0	22°10.9	-1.0	58.6
14	30°52.9	17°22.6	329°10.8	6.0	22°09.8	-1.2	58.6
15	45°52.9	17°23.3	343°35.8	6.0	22°08.6	-1.3	58.6
16	60°52.9	17°23.9	358°00.8	6.0	22°07.2	-1.5	58.6
17	75°53.0	17°24.6	12°25.8	6.0	22°05.7	-1.6	58.7
18	90°53.0	17°25.3	26°50.7	6.0	22°04.0	-1.7	58.7
19	105°53.0	17°25.9	41°15.7	6.0	22°02.2	-1.9	58.7
20	120°53.0	17°26.6	55°40.7	6.0	22°00.2	-2.0	58.7
21	135°53.1	17°27.3	70°05.7	6.0	21°58.1	-2.2	58.7
22	150°53.1	17°27.9	84°30.7	6.0	21°55.9	-2.3	58.7
23	165°53.1	17°28.6	98°55.7	6.0	21°53.5	-2.5	58.7
	SD.=15.8	d=0.7			S.D.=15.9		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	–:–	–:–	00:33	–:–	–:–	–:–
70	–:–	–:–	01:49	22:10	–:–	–:–
68	–:–	–:–	02:26	21:31	–:–	–:–
66	–:–	01:07	02:51	21:05	22:55	–:–
64	–:–	01:52	03:11	20:44	22:05	–:–
62	–:–	02:21	03:27	20:28	21:35	–:–
60	00:59	02:43	03:40	20:14	21:12	23:02
58	01:41	03:00	03:52	20:03	20:55	22:16
56	02:07	03:15	04:02	19:53	20:40	21:48
54	02:28	03:27	04:10	19:44	20:27	21:28
52	02:44	03:38	04:18	19:36	20:16	21:11
50	02:58	03:47	04:25	19:29	20:07	20:57
45	03:25	04:07	04:40	19:14	19:47	20:29
40	03:46	04:22	04:52	19:01	19:31	20:08
35	04:02	04:35	05:03	18:51	19:18	19:52
30	04:15	04:46	05:12	18:42	19:07	19:38
20	04:36	05:04	05:27	18:26	18:49	19:17
10	04:53	05:19	05:41	18:13	18:35	19:00
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:18	05:43	06:05	17:48	18:09	18:35
-20	05:29	05:55	06:18	17:34	17:57	18:24
-30	05:39	06:08	06:33	17:20	17:45	18:13
-35	05:45	06:15	06:42	17:11	17:38	18:08
-40	05:50	06:23	06:51	17:01	17:30	18:02
-45	05:56	06:31	07:03	16:50	17:21	17:56
-50	06:03	06:42	07:16	16:36	17:11	17:50
-52	06:05	06:46	07:23	16:30	17:06	17:47
-54	06:08	06:51	07:30	16:23	17:01	17:44
-56	06:11	06:56	07:38	16:15	16:56	17:41
-58	06:15	07:03	07:47	16:06	16:50	17:37
-60	06:18	07:09	07:57	15:56	16:43	17:34

Lat.	Moonrise Tue	Moonrise Wed	Moonrise Thu	Moonset Tue	Moonset Wed	Moonset Thu
72	–:–	–:–	–:–	–:–	–:–	–:–
70	02:56	–:–	–:–	00:26	–:–	–:–
68	03:50	03:44	–:–	–:–	01:34	–:–
66	04:23	04:40	05:20	–:–	00:38	01:58
64	04:48	05:14	05:59	–:–	00:05	01:19
62	05:07	05:38	06:27	23:41	–:–	00:51
60	05:23	05:58	06:48	23:21	–:–	00:30
58	05:37	06:14	07:05	23:05	–:–	00:13
56	05:49	06:28	07:20	22:52	23:58	–:–
54	05:59	06:40	07:32	22:40	23:46	–:–
52	06:08	06:50	07:44	22:30	23:35	–:–
50	06:16	06:60	07:53	22:20	23:25	–:–
45	06:34	07:20	08:14	22:01	23:04	–:–
40	06:48	07:36	08:31	21:45	22:47	23:44
35	07:00	07:50	08:45	21:32	22:33	23:30
30	07:11	08:01	08:58	21:20	22:21	23:18
20	07:29	08:22	09:19	21:00	21:60	22:57
10	07:46	08:40	09:37	20:43	21:41	22:39
0	08:01	08:57	09:54	20:27	21:24	22:22
-10	08:16	09:13	10:12	20:11	21:07	22:05
-20	08:32	09:31	10:30	19:54	20:49	21:47
-30	08:51	09:52	10:51	19:34	20:27	21:26
-35	09:02	10:04	11:04	19:23	20:15	21:14
-40	09:15	10:18	11:18	19:09	20:01	20:60
-45	09:30	10:35	11:35	18:54	19:44	20:43
-50	09:48	10:56	11:56	18:35	19:23	20:22
-52	09:57	11:05	12:06	18:26	19:13	20:12
-54	10:07	11:16	12:17	18:16	19:02	20:01
-56	10:18	11:29	12:30	18:04	18:49	19:48
-58	10:30	11:44	12:45	17:51	18:35	19:33
-60	10:45	12:01	13:02	17:36	18:17	19:16

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
7	03:23	03:25	11:56	14:13	01:46	3(7%)
8	03:27	03:28	11:56	15:10	02:41	4(14%)
9	03:30	03:31	11:56	16:08	03:39	5(23%)

May 10, 11 ,12 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	227°30.3	205°12.0	7°33.7	141°51.9	24°28.8	325°02.1	-22°37.7	295°27.7	-21°30.1
1	242°32.7	220°11.6	7°34.9	156°52.6	24°28.9	340°04.8	-22°37.7	310°30.2	-21°30.1
2	257°35.2	235°11.2	7°36.0	171°53.3	24°29.0	355°07.5	-22°37.6	325°32.7	-21°30.1
3	272°37.7	250°10.9	7°37.1	186°54.0	24°29.0	10°10.2	-22°37.6	340°35.2	-21°30.1
4	287°40.1	265°10.5	7°38.2	201°54.6	24°29.1	25°12.9	-22°37.6	355°37.7	-21°30.1
5	302°42.6	280°10.1	7°39.4	216°55.3	24°29.1	40°15.6	-22°37.6	10°40.2	-21°30.1
6	317°45.1	295°09.7	7°40.5	231°56.0	24°29.2	55°18.3	-22°37.6	25°42.7	-21°30.1
7	332°47.5	310°09.3	7°41.6	246°56.7	24°29.2	70°21.0	-22°37.6	40°45.2	-21°30.1
8	347°50.0	325°09.0	7°42.8	261°57.4	24°29.3	85°23.7	-22°37.6	55°47.7	-21°30.1
9	2°52.5	340°08.6	7°43.9	276°58.1	24°29.3	100°26.4	-22°37.6	70°50.2	-21°30.1
10	17°54.9	355°08.2	7°45.0	291°58.8	24°29.4	115°29.0	-22°37.6	85°52.8	-21°30.1
11	32°57.4	10°07.8	7°46.1	306°59.4	24°29.5	130°31.7	-22°37.6	100°55.3	-21°30.2
12	47°59.8	25°07.4	7°47.3	322°00.1	24°29.5	145°34.4	-22°37.6	115°57.8	-21°30.2
13	63°02.3	40°07.1	7°48.4	337°00.8	24°29.6	160°37.1	-22°37.5	131°00.3	-21°30.2
14	78°04.8	55°06.7	7°49.5	352°01.5	24°29.6	175°39.8	-22°37.5	146°02.8	-21°30.2
15	93°07.2	70°06.3	7°50.6	7°02.2	24°29.7	190°42.5	-22°37.5	161°05.3	-21°30.2
16	108°09.7	85°05.9	7°51.8	22°02.9	24°29.7	205°45.2	-22°37.5	176°07.8	-21°30.2
17	123°12.2	100°05.5	7°52.9	37°03.6	24°29.8	220°47.9	-22°37.5	191°10.3	-21°30.2
18	138°14.6	115°05.2	7°54.0	52°04.2	24°29.8	235°50.6	-22°37.5	206°12.8	-21°30.2
19	153°17.1	130°04.8	7°55.1	67°04.9	24°29.9	250°53.3	-22°37.5	221°15.3	-21°30.2
20	168°19.6	145°04.4	7°56.3	82°05.6	24°29.9	265°56.0	-22°37.5	236°17.8	-21°30.2
21	183°22.0	160°04.0	7°57.4	97°06.3	24°30.0	280°58.7	-22°37.5	251°20.4	-21°30.2
22	198°24.5	175°03.6	7°58.5	112°07.0	24°30.0	296°01.4	-22°37.5	266°22.9	-21°30.2
23	213°27.0	190°03.3	7°59.6	127°07.7	24°30.1	311°04.1	-22°37.4	281°25.4	-21°30.3
	Mer.pass.:8:48:	v-0.4 d1.1 m-3.8		v0.7 d0.1 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	228°29.4	205°02.9	8°00.8	142°08.3	24°30.1	326°06.8	-22°37.4	296°27.9	-21°30.3
1	243°31.9	220°02.5	8°01.9	157°09.0	24°30.2	341°09.5	-22°37.4	311°30.4	-21°30.3
2	258°34.3	235°02.1	8°03.0	172°09.7	24°30.2	356°12.3	-22°37.4	326°32.9	-21°30.3
3	273°36.8	250°01.7	8°04.1	187°10.4	24°30.3	11°15.0	-22°37.4	341°35.4	-21°30.3
4	288°39.3	265°01.3	8°05.2	202°11.1	24°30.3	26°17.7	-22°37.4	356°37.9	-21°30.3
5	303°41.7	280°01.0	8°06.4	217°11.8	24°30.4	41°20.4	-22°37.4	11°40.4	-21°30.3
6	318°44.2	295°00.6	8°07.5	232°12.5	24°30.4	56°23.1	-22°37.4	26°43.0	-21°30.3
7	333°46.7	310°00.2	8°08.6	247°13.1	24°30.4	71°25.8	-22°37.4	41°45.5	-21°30.3
8	348°49.1	324°59.8	8°09.7	262°13.8	24°30.5	86°28.5	-22°37.4	56°48.0	-21°30.3
9	3°51.6	339°59.4	8°10.8	277°14.5	24°30.5	101°31.2	-22°37.3	71°50.5	-21°30.3
10	18°54.1	354°59.0	8°12.0	292°15.2	24°30.6	116°33.9	-22°37.3	86°53.0	-21°30.3
11	33°56.5	9°58.7	8°13.1	307°15.9	24°30.6	131°36.6	-22°37.3	101°55.5	-21°30.4
12	48°59.0	24°58.3	8°14.2	322°16.6	24°30.7	146°39.3	-22°37.3	116°58.0	-21°30.4
13	64°01.5	39°57.9	8°15.3	337°17.3	24°30.7	161°42.0	-22°37.3	132°00.5	-21°30.4
14	79°03.9	54°57.5	8°16.4	352°17.9	24°30.8	176°44.7	-22°37.3	147°03.1	-21°30.4
15	94°06.4	69°57.1	8°17.6	7°18.6	24°30.8	191°47.4	-22°37.3	162°05.6	-21°30.4
16	109°08.8	84°56.7	8°18.7	22°19.3	24°30.8	206°50.1	-22°37.3	177°08.1	-21°30.4
17	124°11.3	99°56.3	8°19.8	37°20.0	24°30.9	221°52.8	-22°37.3	192°10.6	-21°30.4
18	139°13.8	114°56.0	8°20.9	52°20.7	24°30.9	236°55.5	-22°37.3	207°13.1	-21°30.4
19	154°16.2	129°55.6	8°22.0	67°21.4	24°31.0	251°58.2	-22°37.3	222°15.6	-21°30.4
20	169°18.7	144°55.2	8°23.2	82°22.0	24°31.0	267°00.9	-22°37.2	237°18.1	-21°30.4
21	184°21.2	159°54.8	8°24.3	97°22.7	24°31.1	282°03.6	-22°37.2	252°20.6	-21°30.4
22	199°23.6	174°54.4	8°25.4	112°23.4	24°31.1	297°06.3	-22°37.2	267°23.2	-21°30.5
23	214°26.1	189°54.0	8°26.5	127°24.1	24°31.1	312°09.1	-22°37.2	282°25.7	-21°30.5
	Mer.pass.:8:44:	v-0.4 d1.1 m-3.8		v0.7 d0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	229°28.6	204°53.6	8°27.6	142°24.8	24°31.2	327°11.8	-22°37.2	297°28.2	-21°30.5
1	244°31.0	219°53.2	8°28.7	157°25.5	24°31.2	342°14.5	-22°37.2	312°30.7	-21°30.5
2	259°33.5	234°52.9	8°29.8	172°26.2	24°31.3	357°17.2	-22°37.2	327°33.2	-21°30.5
3	274°35.9	249°52.5	8°31.0	187°26.8	24°31.3	12°19.9	-22°37.2	342°35.7	-21°30.5
4	289°38.4	264°52.1	8°32.1	202°27.5	24°31.3	27°22.6	-22°37.2	357°38.3	-21°30.5
5	304°40.9	279°51.7	8°33.2	217°28.2	24°31.4	42°25.3	-22°37.1	12°40.8	-21°30.5
6	319°43.3	294°51.3	8°34.3	232°28.9	24°31.4	57°28.0	-22°37.1	27°43.3	-21°30.5
7	334°45.8	309°50.9	8°35.4	247°29.6	24°31.5	72°30.7	-22°37.1	42°45.8	-21°30.5
8	349°48.3	324°50.5	8°36.5	262°30.3	24°31.5	87°33.4	-22°37.1	57°48.3	-21°30.5
9	4°50.7	339°50.1	8°37.6	277°31.0	24°31.5	102°36.1	-22°37.1	72°50.8	-21°30.6
10	19°53.2	354°49.7	8°38.8	292°31.6	24°31.6	117°38.9	-22°37.1	87°53.4	-21°30.6
11	34°55.7	9°49.3	8°39.9	307°32.3	24°31.6	132°41.6	-22°37.1	102°55.9	-21°30.6
12	49°58.1	24°48.9	8°41.0	322°33.0	24°31.6	147°44.3	-22°37.1	117°58.4	-21°30.6
13	65°00.6	39°48.6	8°42.1	337°33.7	24°31.7	162°47.0	-22°37.1	133°00.9	-21°30.6
14	80°03.1	54°48.2	8°43.2	352°34.4	24°31.7	177°49.7	-22°37.1	148°03.4	-21°30.6
15	95°05.5	69°47.8	8°44.3	7°35.1	24°31.8	192°52.4	-22°37.0	163°05.9	-21°30.6
16	110°08.0	84°47.4	8°45.4	22°35.8	24°31.8	207°55.1	-22°37.0	178°08.5	-21°30.6
17	125°10.4	99°47.0	8°46.5	37°36.4	24°31.8	222°57.8	-22°37.0	193°11.0	-21°30.6
18	140°12.9	114°46.6	8°47.6	52°37.1	24°31.9	238°00.5	-22°37.0	208°13.5	-21°30.6
19	155°15.4	129°46.2	8°48.8	67°37.8	24°31.9	253°03.3	-22°37.0	223°16.0	-21°30.7
20	170°17.8	144°45.8	8°49.9	82°38.5	24°31.9	268°06.0	-22°37.0	238°18.5	-21°30.7
21	185°20.3	159°45.4	8°51.0	97°39.2	24°32.0	283°08.7	-22°37.0	253°21.0	-21°30.7
22	200°22.8	174°45.0	8°52.1	112°39.9	24°32.0	298°11.4	-22°37.0	268°23.6	-21°30.7
23	215°25.2	189°44.6	8°53.2	127°40.6	24°32.0	313°14.1	-22°37.0	283°26.1	-21°30.7
	Mer.pass.:8:40:	v-0.4 d1.1 m-3.8		v0.7 d0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Stars

	SHA	Dec
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.0	-42°12.1
Schedar	349°36.4	56°38.3
Diphda	348°52.0	-17°53.0
Achernar	335°24.3	-57°08.4
Hamal	327°56.6	23°33.0
Polaris	316°29.7	89°20.6
Akamar	315°15.7	-40°13.8
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.8	-52°42.7
Sirius	258°30.3	-16°44.6
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.7
Avior	234°16.6	-59°34.6
Suhail	222°49.5	-43°30.9
Miaplacidus	221°38.9	-69°48.1
Alphard	217°52.1	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.5	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.3	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.2
Hadar	148°41.6	-60°27.9
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.8
Zubenelg.	137°00.6	-16°07.2
Kochab	137°18.9	74°04.7
Alphecca	126°07.3	26°39.1
Antares	112°21.0	-26°28.3
Atria	107°18.7	-69°03.5
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°06.8
Rasalhague	96°02.5	12°32.8
Etamin	90°43.9	51°29.1
Kaus Aust.	83°38.2	-34°22.3
Vega	80°36.0	38°47.9
Nunki	75°53.1	-26°16.2
Altair	62°04.3	8°55.1
Peacock	53°12.8	-56°40.1
Deneb	49°28.7	45°20.7
Enif	33°43.2	9°57.7
Alnair	27°38.8	-46°51.9
Fomalhaut	15°19.8	-29°31.2
Scheat	13°49.7	28°11.0
Markab	13°34.5	15°18.3

2019/5/1	SHA	Mer.pass
Venus	337°41.7	10:19
Mars	274°21.6	14:32
Jupiter	97°31.8	02:19
Saturn	67°57.4	04:17

2019/5/1	SHA	Mer.pass
Venus	336°33.5	10:20
Mars	273°38.9	14:31
Jupiter	97°37.4	02:15
Saturn	67°58.5	04:13

2019/5/1	SHA	Mer.pass
Venus	335°25.1	10:21
Mars	272°56.2	14:30
Jupiter	97°43.2	02:11
Saturn	67°59.6	04:09

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°53.2	17°29.2	113°20.7	6.0	21°51.0	-2.6	58.8
1	195°53.2	17°29.9	127°45.8	6.0	21°48.3	-2.7	58.8
2	210°53.2	17°30.6	142°10.8	6.0	21°45.5	-2.9	58.8
3	225°53.2	17°31.2	156°35.8	6.0	21°42.5	-3.0	58.8
4	240°53.3	17°31.9	171°00.9	6.1	21°39.4	-3.2	58.8
5	255°53.3	17°32.5	185°26.0	6.1	21°36.2	-3.3	58.8
6	270°53.3	17°33.2	199°51.1	6.1	21°32.8	-3.4	58.8
7	285°53.3	17°33.8	214°16.2	6.1	21°29.3	-3.6	58.8
8	300°53.3	17°34.5	228°41.3	6.1	21°25.6	-3.7	58.9
9	315°53.4	17°35.2	243°06.4	6.1	21°21.9	-3.9	58.9
10	330°53.4	17°35.8	257°31.6	6.2	21°17.9	-4.0	58.9
11	345°53.4	17°36.5	271°56.7	6.2	21°13.9	-4.1	58.9
12	0°53.4	17°37.1	286°21.9	6.2	21°09.6	-4.3	58.9
13	15°53.5	17°37.8	300°47.1	6.2	21°05.3	-4.4	58.9
14	30°53.5	17°38.4	315°12.4	6.3	21°00.8	-4.6	58.9
15	45°53.5	17°39.1	329°37.7	6.3	20°56.2	-4.7	58.9
16	60°53.5	17°39.7	344°03.0	6.3	20°51.4	-4.8	58.9
17	75°53.6	17°40.4	358°28.3	6.3	20°46.6	-5.0	59.0
18	90°53.6	17°41.0	12°53.6	6.4	20°41.5	-5.1	59.0
19	105°53.6	17°41.7	27°19.0	6.4	20°36.4	-5.2	59.0
20	120°53.6	17°42.3	41°44.4	6.4	20°31.1	-5.4	59.0
21	135°53.6	17°43.0	56°09.9	6.5	20°25.7	-5.5	59.0
22	150°53.7	17°43.6	70°35.3	6.5	20°20.1	-5.6	59.0
23	165°53.7	17°44.3	85°00.8	6.5	20°14.4	-5.8	59.0
	SD.=15.8	d=0.7			S.D.=16.0		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°53.7	17°44.9	99°26.4	6.6	20°08.6	-5.9	59.0
1	195°53.7	17°45.6	113°52.0	6.6	20°02.6	-6.0	59.0
2	210°53.7	17°46.2	128°17.6	6.6	19°56.6	-6.1	59.1
3	225°53.8	17°46.9	142°43.2	6.7	19°50.4	-6.3	59.1
4	240°53.8	17°47.5	157°08.9	6.7	19°44.0	-6.4	59.1
5	255°53.8	17°48.2	171°34.6	6.7	19°37.6	-6.5	59.1
6	270°53.8	17°48.8	186°00.4	6.8	19°31.0	-6.6	59.1
7	285°53.8	17°49.5	200°26.2	6.8	19°24.3	-6.8	59.1
8	300°53.9	17°50.1	214°52.0	6.9	19°17.4	-6.9	59.1
9	315°53.9	17°50.8	229°17.9	6.9	19°10.5	-7.0	59.1
10	330°53.9	17°51.4	243°43.8	6.9	19°03.4	-7.1	59.1
11	345°53.9	17°52.0	258°09.8	7.0	18°56.2	-7.3	59.1
12	0°53.9	17°52.7	272°35.8	7.0	18°48.9	-7.4	59.1
13	15°53.9	17°53.3	287°01.9	7.1	18°41.4	-7.5	59.2
14	30°54.0	17°54.0	301°28.0	7.1	18°33.9	-7.6	59.2
15	45°54.0	17°54.6	315°54.1	7.2	18°26.2	-7.7	59.2
16	60°54.0	17°55.2	330°20.3	7.2	18°18.4	-7.9	59.2
17	75°54.0	17°55.9	344°46.5	7.3	18°10.5	-8.0	59.2
18	90°54.0	17°56.5	359°12.8	7.3	18°02.5	-8.1	59.2
19	105°54.0	17°57.2	13°39.1	7.3	17°54.3	-8.2	59.2
20	120°54.1	17°57.8	28°05.5	7.4	17°46.1	-8.3	59.2
21	135°54.1	17°58.4	42°31.9	7.4	17°37.7	-8.4	59.2
22	150°54.1	17°59.1	56°58.3	7.5	17°29.2	-8.5	59.2
23	165°54.1	17°59.7	71°24.9	7.5	17°20.6	-8.6	59.2
	SD.=15.8	d=0.6			S.D.=16.1		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°54.1	18°00.3	85°51.4	7.6	17°11.9	-8.8	59.2
1	195°54.1	18°01.0	100°18.0	7.6	17°03.1	-8.9	59.3
2	210°54.1	18°01.6	114°44.7	7.7	16°54.2	-9.0	59.3
3	225°54.2	18°02.3	129°11.4	7.7	16°45.2	-9.1	59.3
4	240°54.2	18°02.9	143°38.1	7.8	16°36.1	-9.2	59.3
5	255°54.2	18°03.5	158°04.9	7.8	16°26.8	-9.3	59.3
6	270°54.2	18°04.2	172°31.7	7.9	16°17.5	-9.4	59.3
7	285°54.2	18°04.8	186°58.6	7.9	16°08.1	-9.5	59.3
8	300°54.2	18°05.4	201°25.6	8.0	15°58.6	-9.6	59.3
9	315°54.2	18°06.0	215°52.6	8.0	15°48.9	-9.7	59.3
10	330°54.2	18°06.7	230°19.6	8.1	15°39.2	-9.8	59.3
11	345°54.3	18°07.3	244°46.7	8.1	15°29.4	-9.9	59.3
12	0°54.3	18°07.9	259°13.8	8.2	15°19.5	-10.0	59.3
13	15°54.3	18°08.6	273°41.0	8.2	15°09.4	-10.1	59.3
14	30°54.3	18°09.2	288°08.3	8.3	14°59.3	-10.2	59.3
15	45°54.3	18°09.8	302°35.6	8.3	14°49.1	-10.2	59.3
16	60°54.3	18°10.4	317°02.9	8.4	14°38.8	-10.3	59.3
17	75°54.3	18°11.1	331°30.3	8.4	14°28.5	-10.4	59.3
18	90°54.3	18°11.7	345°57.7	8.5	14°18.0	-10.5	59.4
19	105°54.3	18°12.3	0°25.2	8.5	14°07.4	-10.6	59.4
20	120°54.4	18°13.0	14°52.7	8.6	13°56.8	-10.7	59.4
21	135°54.4	18°13.6	29°20.3	8.6	13°46.1	-10.8	59.4
22	150°54.4	18°14.2	43°47.9	8.6	13°35.3	-10.9	59.4
23	165°54.4	18°14.8	58°15.6	8.7	13°24.4	-10.9	59.4
	SD.=15.8	d=0.6			S.D.=16.2		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	01:26	22:34	–:–	–:–
68	–:–	–:–	02:10	21:47	–:–	–:–
66	–:–	00:31	02:39	21:16	–:–	–:–
64	–:–	01:36	03:01	20:54	22:22	–:–
62	–:–	02:09	03:19	20:36	21:47	–:–
60	00:27	02:33	03:33	20:22	21:22	–:–
58	01:26	02:52	03:45	20:09	21:03	22:31
56	01:57	03:08	03:56	19:58	20:47	21:59
54	02:19	03:21	04:05	19:49	20:34	21:36
52	02:37	03:32	04:13	19:41	20:22	21:18
50	02:52	03:42	04:21	19:33	20:12	21:03
45	03:20	04:03	04:36	19:17	19:51	20:34
40	03:42	04:19	04:49	19:04	19:35	20:12
35	03:59	04:32	05:00	18:53	19:21	19:55
30	04:13	04:44	05:10	18:44	19:10	19:41
20	04:35	05:02	05:26	18:27	18:51	19:18
10	04:52	05:18	05:40	18:13	18:35	19:01
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:18	05:44	06:06	17:47	18:09	18:34
-20	05:30	05:56	06:20	17:33	17:56	18:23
-30	05:41	06:10	06:35	17:17	17:43	18:11
-35	05:47	06:17	06:44	17:08	17:35	18:06
-40	05:53	06:25	06:54	16:58	17:27	17:59
-45	05:59	06:35	07:06	16:46	17:18	17:53
-50	06:06	06:45	07:21	16:32	17:07	17:46
-52	06:09	06:50	07:27	16:25	17:02	17:43
-54	06:13	06:56	07:35	16:17	16:56	17:39
-56	06:16	07:02	07:43	16:09	16:51	17:36
-58	06:20	07:08	07:53	15:59	16:44	17:32
-60	06:24	07:15	08:04	15:48	16:37	17:28

		Moonrise			**Moonset**	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	08:35	–:–	–:–	04:45
70	–:–	06:41	09:16	–:–	04:40	04:02
68	05:35	07:42	09:44	03:45	03:38	03:33
66	06:36	08:17	10:05	02:44	03:03	03:11
64	07:11	08:42	10:22	02:09	02:38	02:54
62	07:36	09:01	10:35	01:43	02:17	02:39
60	07:55	09:17	10:47	01:23	02:01	02:27
58	08:12	09:31	10:57	01:07	01:47	02:16
56	08:26	09:42	11:05	00:53	01:35	02:07
54	08:37	09:52	11:13	00:41	01:25	01:59
52	08:48	10:01	11:20	00:30	01:15	01:51
50	08:57	10:09	11:26	00:20	01:07	01:45
45	09:17	10:26	11:39	00:00	00:49	01:30
40	09:33	10:40	11:50	–:–	00:34	01:18
35	09:47	10:52	11:60	–:–	00:22	01:08
30	09:59	11:02	12:08	–:–	00:11	00:59
20	10:19	11:20	12:22	23:52	–:–	00:43
10	10:36	11:36	12:34	23:36	–:–	00:29
0	10:53	11:50	12:45	23:20	–:–	00:17
-10	11:09	12:04	12:57	23:05	–:–	00:04
-20	11:26	12:19	13:09	22:48	23:50	–:–
-30	11:46	12:37	13:23	22:29	23:34	–:–
-35	11:58	12:47	13:31	22:17	23:24	–:–
-40	12:12	12:59	13:40	22:05	23:13	–:–
-45	12:27	13:12	13:50	21:49	23:01	–:–
-50	12:47	13:29	14:03	21:30	22:45	–:–
-52	12:56	13:37	14:09	21:21	22:38	23:58
-54	13:07	13:45	14:15	21:11	22:30	23:52
-56	13:18	13:55	14:23	20:60	22:21	23:46
-58	13:32	14:06	14:31	20:47	22:10	23:38
-60	13:47	14:18	14:40	20:31	21:58	23:30

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	03:33	03:34	11:56	17:06	04:37	6(33%)
11	03:35	03:36	11:56	18:03	05:35	7(44%)
12	03:36	03:37	11:56	18:58	06:31	8(55%)

May 13, 14 ,15 (Mon., Tue., Wed.)

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	230°27.7	204°44.2	8°54.3	142°41.2	24°32.1	328°16.8	-22°37.0	298°28.6	-21°30.7
1	245°30.2	219°43.8	8°55.4	157°41.9	24°32.1	343°19.5	-22°36.9	313°31.1	-21°30.7
2	260°32.6	234°43.4	8°56.5	172°42.6	24°32.1	358°22.3	-22°36.9	328°33.6	-21°30.7
3	275°35.1	249°43.0	8°57.6	187°43.3	24°32.2	13°25.0	-22°36.9	343°36.2	-21°30.7
4	290°37.6	264°42.6	8°58.7	202°44.0	24°32.2	28°27.7	-22°36.9	358°38.7	-21°30.7
5	305°40.0	279°42.2	8°59.8	217°44.7	24°32.2	43°30.4	-22°36.9	13°41.2	-21°30.8
6	320°42.5	294°41.8	9°00.9	232°45.4	24°32.2	58°33.1	-22°36.9	28°43.7	-21°30.8
7	335°44.9	309°41.5	9°02.1	247°46.0	24°32.3	73°35.8	-22°36.9	43°46.2	-21°30.8
8	350°47.4	324°41.1	9°03.2	262°46.7	24°32.3	88°38.5	-22°36.9	58°48.8	-21°30.8
9	5°49.9	339°40.7	9°04.3	277°47.4	24°32.3	103°41.3	-22°36.9	73°51.3	-21°30.8
10	20°52.3	354°40.3	9°05.4	292°48.1	24°32.4	118°44.0	-22°36.8	88°53.8	-21°30.8
11	35°54.8	9°39.9	9°06.5	307°48.8	24°32.4	133°46.7	-22°36.8	103°56.3	-21°30.8
12	50°57.3	24°39.5	9°07.6	322°49.5	24°32.4	148°49.4	-22°36.8	118°58.8	-21°30.8
13	65°59.7	39°39.1	9°08.7	337°50.2	24°32.4	163°52.1	-22°36.8	134°01.4	-21°30.8
14	81°02.2	54°38.7	9°09.8	352°50.9	24°32.5	178°54.8	-22°36.8	149°03.9	-21°30.8
15	96°04.7	69°38.3	9°10.9	7°51.5	24°32.5	193°57.6	-22°36.8	164°06.4	-21°30.9
16	111°07.1	84°37.9	9°12.0	22°52.2	24°32.5	209°00.3	-22°36.8	179°08.9	-21°30.9
17	126°09.6	99°37.5	9°13.1	37°52.9	24°32.6	224°03.0	-22°36.8	194°11.4	-21°30.9
18	141°12.0	114°37.1	9°14.2	52°53.6	24°32.6	239°05.7	-22°36.8	209°14.0	-21°30.9
19	156°14.5	129°36.7	9°15.3	67°54.3	24°32.6	254°08.4	-22°36.8	224°16.5	-21°30.9
20	171°17.0	144°36.3	9°16.4	82°55.0	24°32.6	269°11.2	-22°36.7	239°19.0	-21°30.9
21	186°19.4	159°35.9	9°17.5	97°55.7	24°32.7	284°13.9	-22°36.7	254°21.5	-21°30.9
22	201°21.9	174°35.5	9°18.6	112°56.3	24°32.7	299°16.6	-22°36.7	269°24.1	-21°30.9
23	216°24.4	189°35.1	9°19.7	127°57.0	24°32.7	314°19.3	-22°36.7	284°26.6	-21°30.9
Mer.pass.:8:36:		v-0.4 d1.1 m-3.8		v0.7 d0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	231°26.8	204°34.7	9°20.8	142°57.7	24°32.7	329°22.0	-22°36.7	299°29.1	-21°30.9
1	246°29.3	219°34.3	9°21.9	157°58.4	24°32.8	344°24.8	-22°36.7	314°31.6	-21°31.0
2	261°31.8	234°33.9	9°23.0	172°59.1	24°32.8	359°27.5	-22°36.7	329°34.2	-21°31.0
3	276°34.2	249°33.4	9°24.1	187°59.8	24°32.8	14°30.2	-22°36.7	344°36.7	-21°31.0
4	291°36.7	264°33.0	9°25.2	203°00.5	24°32.8	29°32.9	-22°36.7	359°39.2	-21°31.0
5	306°39.2	279°32.6	9°26.3	218°01.2	24°32.8	44°35.6	-22°36.6	14°41.7	-21°31.0
6	321°41.6	294°32.2	9°27.4	233°01.8	24°32.9	59°38.4	-22°36.6	29°44.2	-21°31.0
7	336°44.1	309°31.8	9°28.5	248°02.5	24°32.9	74°41.1	-22°36.6	44°46.8	-21°31.0
8	351°46.5	324°31.4	9°29.6	263°03.2	24°32.9	89°43.8	-22°36.6	59°49.3	-21°31.0
9	6°49.0	339°31.0	9°30.7	278°03.9	24°32.9	104°46.5	-22°36.6	74°51.8	-21°31.0
10	21°51.5	354°30.6	9°31.8	293°04.6	24°33.0	119°49.3	-22°36.6	89°54.3	-21°31.0
11	36°53.9	9°30.2	9°32.9	308°05.3	24°33.0	134°52.0	-22°36.6	104°56.9	-21°31.1
12	51°56.4	24°29.8	9°34.0	323°06.0	24°33.0	149°54.7	-22°36.6	119°59.4	-21°31.1
13	66°58.9	39°29.4	9°35.1	338°06.6	24°33.0	164°57.4	-22°36.6	135°01.9	-21°31.1
14	82°01.3	54°29.0	9°36.2	353°07.3	24°33.0	180°00.1	-22°36.5	150°04.4	-21°31.1
15	97°03.8	69°28.6	9°37.3	8°08.0	24°33.1	195°02.9	-22°36.5	165°07.0	-21°31.1
16	112°06.3	84°28.2	9°38.4	23°08.7	24°33.1	210°05.6	-22°36.5	180°09.5	-21°31.1
17	127°08.7	99°27.8	9°39.5	38°09.4	24°33.1	225°08.3	-22°36.5	195°12.0	-21°31.1
18	142°11.2	114°27.4	9°40.6	53°10.1	24°33.1	240°11.0	-22°36.5	210°14.6	-21°31.1
19	157°13.7	129°27.0	9°41.7	68°10.8	24°33.1	255°13.8	-22°36.5	225°17.1	-21°31.1
20	172°16.1	144°26.6	9°42.7	83°11.5	24°33.1	270°16.5	-22°36.5	240°19.6	-21°31.2
21	187°18.6	159°26.1	9°43.8	98°12.1	24°33.2	285°19.2	-22°36.5	255°22.1	-21°31.2
22	202°21.0	174°25.7	9°44.9	113°12.8	24°33.2	300°21.9	-22°36.5	270°24.7	-21°31.2
23	217°23.5	189°25.3	9°46.0	128°13.5	24°33.2	315°24.7	-22°36.4	285°27.2	-21°31.2
Mer.pass.:8:32:		v-0.4 d1.1 m-3.8		v0.7 d0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	232°26.0	204°24.9	9°47.1	143°14.2	24°33.2	330°27.4	-22°36.4	300°29.7	-21°31.2
1	247°28.4	219°24.5	9°48.2	158°14.9	24°33.2	345°30.1	-22°36.4	315°32.2	-21°31.2
2	262°30.9	234°24.1	9°49.3	173°15.6	24°33.2	0°32.8	-22°36.4	330°34.8	-21°31.2
3	277°33.4	249°23.7	9°50.4	188°16.3	24°33.3	15°35.6	-22°36.4	345°37.3	-21°31.2
4	292°35.8	264°23.3	9°51.5	203°17.0	24°33.3	30°38.3	-22°36.4	0°39.8	-21°31.2
5	307°38.3	279°22.9	9°52.6	218°17.6	24°33.3	45°41.0	-22°36.4	15°42.3	-21°31.3
6	322°40.8	294°22.5	9°53.7	233°18.3	24°33.3	60°43.8	-22°36.4	30°44.9	-21°31.3
7	337°43.2	309°22.0	9°54.8	248°19.0	24°33.3	75°46.5	-22°36.4	45°47.4	-21°31.3
8	352°45.7	324°21.6	9°55.8	263°19.7	24°33.3	90°49.2	-22°36.3	60°49.9	-21°31.3
9	7°48.1	339°21.2	9°56.9	278°20.4	24°33.3	105°51.9	-22°36.3	75°52.5	-21°31.3
10	22°50.6	354°20.8	9°58.0	293°21.1	24°33.4	120°54.7	-22°36.3	90°55.0	-21°31.3
11	37°53.1	9°20.4	9°59.1	308°21.8	24°33.4	135°57.4	-22°36.3	105°57.5	-21°31.3
12	52°55.5	24°20.0	10°00.2	323°22.5	24°33.4	151°00.1	-22°36.3	121°00.0	-21°31.3
13	67°58.0	39°19.6	10°01.3	338°23.1	24°33.4	166°02.8	-22°36.3	136°02.6	-21°31.3
14	83°00.5	54°19.2	10°02.4	353°23.8	24°33.4	181°05.6	-22°36.3	151°05.1	-21°31.4
15	98°02.9	69°18.7	10°03.5	8°24.5	24°33.4	196°08.3	-22°36.3	166°07.6	-21°31.4
16	113°05.4	84°18.3	10°04.5	23°25.2	24°33.4	211°11.0	-22°36.3	181°10.2	-21°31.4
17	128°07.9	99°17.9	10°05.6	38°25.9	24°33.4	226°13.8	-22°36.2	196°12.7	-21°31.4
18	143°10.3	114°17.5	10°06.7	53°26.6	24°33.4	241°16.5	-22°36.2	211°15.2	-21°31.4
19	158°12.8	129°17.1	10°07.8	68°27.3	24°33.5	256°19.2	-22°36.2	226°17.8	-21°31.4
20	173°15.3	144°16.7	10°08.9	83°28.0	24°33.5	271°22.0	-22°36.2	241°20.3	-21°31.4
21	188°17.7	159°16.2	10°10.0	98°28.6	24°33.5	286°24.7	-22°36.2	256°22.8	-21°31.4
22	203°20.2	174°15.8	10°11.1	113°29.3	24°33.5	301°27.4	-22°36.2	271°25.3	-21°31.4
23	218°22.6	189°15.4	10°12.1	128°30.0	24°33.5	316°30.2	-22°36.2	286°27.9	-21°31.5
Mer.pass.:8:28:		v-0.4 d1.1 m-3.8		v0.7 d0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Stars

Star	SHA	Dec
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.0	-42°12.1
Schedar	349°36.4	56°38.2
Diphda	348°52.0	-17°53.0
Achernar	335°24.3	-57°08.4
Hamal	327°56.6	23°33.0
Polaris	316°29.5	89°20.6
Akamar	315°15.7	-40°13.8
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.8	-52°42.7
Sirius	258°30.3	-16°44.6
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.8
Avior	234°16.6	-59°34.6
Suhail	222°49.6	-43°30.9
Miaplacidus	221°39.0	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.5	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.3	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.7	55°51.5
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.2
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.8
Zubenelg.	137°00.6	-16°07.2
Kochab	137°18.9	74°04.7
Alphecca	126°07.3	26°39.1
Antares	112°21.0	-26°28.3
Atria	107°18.7	-69°03.5
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°06.9
Rasalhague	96°02.5	12°32.8
Etamin	90°43.8	51°29.1
Kaus Aust.	83°38.2	-34°22.3
Vega	80°36.0	38°47.9
Nunki	75°53.1	-26°16.2
Altair	62°04.3	8°55.1
Peacock	53°12.8	-56°40.1
Deneb	49°28.6	45°20.7
Enif	33°43.2	9°57.7
Alnair	27°38.8	-46°51.9
Fomalhaut	15°19.8	-29°31.2
Scheat	13°49.7	28°11.0
Markab	13°34.5	15°18.3

2019/5/1	SHA	Mer.pass
Venus	334°16.5	10:21
Mars	272°13.6	14:29
Jupiter	97°49.1	02:06
Saturn	68°00.9	04:05

2019/5/1	SHA	Mer.pass
Venus	333°07.8	10:22
Mars	271°30.9	14:27
Jupiter	97°55.2	02:02
Saturn	68°02.3	04:01

2019/5/1	SHA	Mer.pass
Venus	331°58.9	10:23
Mars	270°48.2	14:26
Jupiter	98°01.4	01:58
Saturn	68°03.7	03:57

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°54.4	18°15.4	72°43.3	8.7	13°13.4	-11.0	59.4
1	195°54.4	18°16.1	87°11.1	8.8	13°02.3	-11.1	59.4
2	210°54.4	18°16.7	101°38.9	8.8	12°51.2	-11.2	59.4
3	225°54.4	18°17.3	116°06.7	8.9	12°40.0	-11.2	59.4
4	240°54.4	18°17.9	130°34.6	8.9	12°28.7	-11.3	59.4
5	255°54.4	18°18.6	145°02.6	9.0	12°17.3	-11.4	59.4
6	270°54.4	18°19.2	159°30.6	9.0	12°05.9	-11.5	59.4
7	285°54.4	18°19.8	173°58.6	9.1	11°54.4	-11.5	59.4
8	300°54.4	18°20.4	188°26.7	9.1	11°42.8	-11.6	59.4
9	315°54.5	18°21.0	202°54.8	9.1	11°31.2	-11.7	59.4
10	330°54.5	18°21.6	217°23.0	9.2	11°19.5	-11.8	59.4
11	345°54.5	18°22.3	231°51.2	9.2	11°07.7	-11.8	59.4
12	0°54.5	18°22.9	246°19.4	9.3	10°55.8	-11.9	59.4
13	15°54.5	18°23.5	260°47.7	9.3	10°43.9	-11.9	59.4
14	30°54.5	18°24.1	275°16.1	9.4	10°31.9	-12.0	59.4
15	45°54.5	18°24.7	289°44.5	9.4	10°19.9	-12.1	59.4
16	60°54.5	18°25.3	304°12.9	9.4	10°07.8	-12.1	59.4
17	75°54.5	18°26.0	318°41.3	9.5	9°55.6	-12.2	59.4
18	90°54.5	18°26.6	333°09.8	9.5	9°43.4	-12.2	59.4
19	105°54.5	18°27.2	347°38.4	9.6	9°31.1	-12.3	59.4
20	120°54.5	18°27.8	2°07.0	9.6	9°18.8	-12.4	59.4
21	135°54.5	18°28.4	16°35.6	9.6	9°06.4	-12.4	59.4
22	150°54.5	18°29.0	31°04.2	9.7	8°54.0	-12.5	59.4
23	165°54.5	18°29.6	45°32.9	9.7	8°41.5	-12.5	59.4
	SD.=15.8	d=0.6			S.D.=16.2		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°54.5	18°30.2	60°01.6	9.7	8°29.0	-12.6	59.4
1	195°54.5	18°30.8	74°30.4	9.8	8°16.4	-12.6	59.4
2	210°54.5	18°31.5	88°59.2	9.8	8°03.7	-12.7	59.4
3	225°54.5	18°32.1	103°28.0	9.8	7°51.0	-12.7	59.4
4	240°54.5	18°32.7	117°56.9	9.9	7°38.3	-12.7	59.4
5	255°54.5	18°33.3	132°25.8	9.9	7°25.5	-12.8	59.4
6	270°54.5	18°33.9	146°54.7	9.9	7°12.7	-12.8	59.4
7	285°54.5	18°34.5	161°23.7	10.0	6°59.9	-12.9	59.4
8	300°54.5	18°35.1	175°52.7	10.0	6°47.0	-12.9	59.4
9	315°54.5	18°35.7	190°21.7	10.0	6°34.0	-13.0	59.4
10	330°54.5	18°36.3	204°50.7	10.1	6°21.1	-13.0	59.4
11	345°54.5	18°36.9	219°19.8	10.1	6°08.1	-13.0	59.4
12	0°54.5	18°37.5	233°48.9	10.1	5°55.0	-13.1	59.4
13	15°54.5	18°38.1	248°18.1	10.1	5°42.0	-13.1	59.4
14	30°54.5	18°38.7	262°47.2	10.2	5°28.9	-13.1	59.4
15	45°54.5	18°39.3	277°16.4	10.2	5°15.7	-13.1	59.4
16	60°54.5	18°39.9	291°45.6	10.2	5°02.6	-13.2	59.4
17	75°54.5	18°40.5	306°14.9	10.2	4°49.4	-13.2	59.4
18	90°54.5	18°41.1	320°44.1	10.3	4°36.2	-13.2	59.4
19	105°54.5	18°41.7	335°13.4	10.3	4°22.9	-13.3	59.4
20	120°54.5	18°42.3	349°42.7	10.3	4°09.6	-13.3	59.4
21	135°54.5	18°42.9	4°12.0	10.3	3°56.4	-13.3	59.4
22	150°54.5	18°43.5	18°41.4	10.4	3°43.0	-13.3	59.4
23	165°54.5	18°44.1	33°10.7	10.4	3°29.7	-13.3	59.4
	SD.=15.8	d=0.6			S.D.=16.2		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°54.5	18°44.7	47°40.1	10.4	3°16.4	-13.4	59.4
1	195°54.5	18°45.3	62°09.5	10.4	3°03.0	-13.4	59.3
2	210°54.5	18°45.9	76°38.9	10.4	2°49.6	-13.4	59.3
3	225°54.5	18°46.5	91°08.4	10.4	2°36.2	-13.4	59.3
4	240°54.5	18°47.1	105°37.8	10.5	2°22.8	-13.4	59.3
5	255°54.5	18°47.7	120°07.3	10.5	2°09.4	-13.4	59.3
6	270°54.5	18°48.3	134°36.8	10.5	1°56.0	-13.4	59.3
7	285°54.5	18°48.9	149°06.3	10.5	1°42.5	-13.4	59.3
8	300°54.5	18°49.5	163°35.8	10.5	1°29.1	-13.4	59.3
9	315°54.5	18°50.1	178°05.3	10.5	1°15.6	-13.5	59.3
10	330°54.5	18°50.7	192°34.9	10.5	1°02.2	-13.5	59.3
11	345°54.5	18°51.2	207°04.4	10.6	0°48.7	-13.5	59.3
12	0°54.5	18°51.8	221°34.0	10.6	0°35.3	-13.5	59.3
13	15°54.5	18°52.4	236°03.5	10.6	0°21.8	-13.5	59.3
14	30°54.5	18°53.0	250°33.1	10.6	0°08.3	-13.5	59.3
15	45°54.5	18°53.6	265°02.7	10.6	-0°05.1	-13.5	59.2
16	60°54.4	18°54.2	279°32.3	10.6	-0°18.6	-13.5	59.2
17	75°54.4	18°54.8	294°01.9	10.6	-0°32.0	-13.4	59.2
18	90°54.4	18°55.4	308°31.5	10.6	-0°45.5	-13.4	59.2
19	105°54.4	18°56.0	323°01.1	10.6	-0°58.9	-13.4	59.2
20	120°54.4	18°56.5	337°30.7	10.6	-1°12.3	-13.4	59.2
21	135°54.4	18°57.1	352°00.3	10.6	-1°25.8	-13.4	59.2
22	150°54.4	18°57.7	6°29.9	10.6	-1°39.2	-13.4	59.2
23	165°54.4	18°58.3	20°59.5	10.6	-1°52.6	-13.4	59.2
	SD.=15.8	d=0.6			S.D.=16.2		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	00:58	23:07	–:–	–:–
68	–:–	–:–	01:55	22:03	–:–	–:–
66	–:–	–:–	02:28	21:28	–:–	–:–
64	–:–	01:17	02:51	21:04	22:41	–:–
62	–:–	01:57	03:10	20:44	21:59	–:–
60	–:–	02:24	03:26	20:29	21:32	–:–
58	01:09	02:44	03:39	20:16	21:11	22:49
56	01:46	03:01	03:50	20:04	20:54	22:10
54	02:10	03:14	03:60	19:54	20:40	21:45
52	02:29	03:27	04:08	19:45	20:27	21:25
50	02:45	03:37	04:16	19:38	20:17	21:09
45	03:16	03:59	04:33	19:21	19:55	20:38
40	03:38	04:16	04:46	19:07	19:38	20:16
35	03:56	04:30	04:58	18:56	19:24	19:58
30	04:10	04:41	05:08	18:46	19:12	19:43
20	04:33	05:01	05:25	18:28	18:52	19:20
10	04:51	05:17	05:39	18:14	18:36	19:02
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:19	05:44	06:06	17:46	18:08	18:34
-20	05:31	05:57	06:21	17:32	17:55	18:22
-30	05:43	06:12	06:37	17:15	17:41	18:10
-35	05:49	06:19	06:46	17:06	17:33	18:03
-40	05:55	06:28	06:57	16:55	17:24	17:57
-45	06:02	06:38	07:10	16:43	17:14	17:50
-50	06:10	06:49	07:25	16:27	17:03	17:42
-52	06:13	06:55	07:32	16:20	16:58	17:39
-54	06:17	07:00	07:40	16:12	16:52	17:35
-56	06:21	07:06	07:49	16:03	16:46	17:31
-58	06:25	07:13	07:59	15:53	16:39	17:27
-60	06:29	07:21	08:10	15:42	16:31	17:23

		Moonrise			**Moonset**	
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	11:07	13:19	15:25	04:07	03:44	03:25
70	11:26	13:27	15:24	03:45	03:33	03:22
68	11:41	13:34	15:24	03:29	03:24	03:20
66	11:53	13:39	15:24	03:15	03:17	03:17
64	12:03	13:44	15:23	03:04	03:10	03:16
62	12:12	13:48	15:23	02:54	03:05	03:14
60	12:19	13:51	15:23	02:46	03:00	03:12
58	12:25	13:54	15:23	02:38	02:56	03:11
56	12:31	13:57	15:23	02:32	02:52	03:10
54	12:36	13:60	15:23	02:26	02:49	03:09
52	12:41	14:02	15:22	02:21	02:46	03:08
50	12:45	14:04	15:22	02:16	02:43	03:07
45	12:54	14:08	15:22	02:05	02:36	03:05
40	13:01	14:12	15:22	01:57	02:31	03:03
35	13:07	14:15	15:22	01:49	02:27	03:02
30	13:13	14:18	15:22	01:42	02:23	03:01
20	13:23	14:22	15:21	01:31	02:16	02:59
10	13:31	14:27	15:21	01:21	02:09	02:57
0	13:39	14:31	15:21	01:11	02:04	02:55
-10	13:47	14:34	15:21	01:01	01:58	02:53
-20	13:55	14:39	15:21	00:51	01:51	02:51
-30	14:04	14:43	15:21	00:39	01:44	02:48
-35	14:10	14:46	15:21	00:32	01:40	02:47
-40	14:16	14:49	15:21	00:24	01:35	02:45
-45	14:23	14:53	15:21	00:15	01:29	02:43
-50	14:32	14:57	15:21	00:03	01:22	02:41
-52	14:36	14:59	15:21	–:–	01:19	02:40
-54	14:40	15:01	15:21	–:–	01:16	02:39
-56	14:45	15:03	15:21	–:–	01:12	02:38
-58	14:50	15:06	15:21	–:–	01:07	02:36
-60	14:56	15:09	15:21	–:–	01:03	02:35

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	03:38	03:38	11:56	19:51	07:24	9(67%)
14	03:38	03:38	11:56	20:42	08:17	10(77%)
15	03:38	03:38	11:56	21:33	09:07	11(86%)

May 16, 17 ,18 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	233°25.1	204°15.0	10°13.2	143°30.7	24°33.5	331°32.9	-22°36.2	301°30.4	-21°31.5
1	248°27.6	219°14.6	10°14.3	158°31.4	24°33.5	346°35.6	-22°36.2	316°32.9	-21°31.5
2	263°30.0	234°14.2	10°15.4	173°32.1	24°33.5	1°38.3	-22°36.1	331°35.5	-21°31.5
3	278°32.5	249°13.7	10°16.5	188°32.8	24°33.5	16°41.1	-22°36.1	346°38.0	-21°31.5
4	293°35.0	264°13.3	10°17.6	203°33.5	24°33.5	31°43.8	-22°36.1	1°40.5	-21°31.5
5	308°37.4	279°12.9	10°18.6	218°34.2	24°33.5	46°46.5	-22°36.1	16°43.1	-21°31.5
6	323°39.9	294°12.5	10°19.7	233°34.8	24°33.5	61°49.3	-22°36.1	31°45.6	-21°31.5
7	338°42.4	309°12.1	10°20.8	248°35.5	24°33.5	76°52.0	-22°36.1	46°48.1	-21°31.5
8	353°44.8	324°11.6	10°21.9	263°36.2	24°33.5	91°54.7	-22°36.1	61°50.7	-21°31.6
9	8°47.3	339°11.2	10°23.0	278°36.9	24°33.6	106°57.5	-22°36.1	76°53.2	-21°31.6
10	23°49.7	354°10.8	10°24.0	293°37.6	24°33.6	122°00.2	-22°36.0	91°55.7	-21°31.6
11	38°52.2	9°10.4	10°25.1	308°38.3	24°33.6	137°02.9	-22°36.0	106°58.3	-21°31.6
12	53°54.7	24°10.0	10°26.2	323°39.0	24°33.6	152°05.7	-22°36.0	122°00.8	-21°31.6
13	68°57.1	39°09.5	10°27.3	338°39.7	24°33.6	167°08.4	-22°36.0	137°03.3	-21°31.6
14	83°59.6	54°09.1	10°28.3	353°40.4	24°33.6	182°11.1	-22°36.0	152°05.9	-21°31.6
15	99°02.1	69°08.7	10°29.4	8°41.0	24°33.6	197°13.9	-22°36.0	167°08.4	-21°31.6
16	114°04.5	84°08.3	10°30.5	23°41.7	24°33.6	212°16.6	-22°36.0	182°10.9	-21°31.7
17	129°07.0	99°07.9	10°31.6	38°42.4	24°33.6	227°19.4	-22°36.0	197°13.5	-21°31.7
18	144°09.5	114°07.4	10°32.7	53°43.1	24°33.6	242°22.1	-22°36.0	212°16.0	-21°31.7
19	159°11.9	129°07.0	10°33.7	68°43.8	24°33.6	257°24.8	-22°35.9	227°18.5	-21°31.7
20	174°14.4	144°06.6	10°34.8	83°44.5	24°33.6	272°27.6	-22°35.9	242°21.1	-21°31.7
21	189°16.9	159°06.2	10°35.9	98°45.2	24°33.6	287°30.3	-22°35.9	257°23.6	-21°31.7
22	204°19.3	174°05.7	10°37.0	113°45.9	24°33.6	302°33.0	-22°35.9	272°26.1	-21°31.7
23	219°21.8	189°05.3	10°38.0	128°46.6	24°33.6	317°35.8	-22°35.9	287°28.7	-21°31.7
Mer.pass.:8:24:		v-0.4 d1.1 m-3.8		v0.7 d0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	234°24.2	204°04.9	10°39.1	143°47.2	24°33.6	332°38.5	-22°35.9	302°31.2	-21°31.7
1	249°26.7	219°04.5	10°40.2	158°47.9	24°33.6	347°41.2	-22°35.9	317°33.7	-21°31.8
2	264°29.2	234°04.0	10°41.3	173°48.6	24°33.6	2°44.0	-22°35.9	332°36.3	-21°31.8
3	279°31.6	249°03.6	10°42.3	188°49.3	24°33.6	17°46.7	-22°35.8	347°38.8	-21°31.8
4	294°34.1	264°03.2	10°43.4	203°50.0	24°33.6	32°49.5	-22°35.8	2°41.4	-21°31.8
5	309°36.6	279°02.8	10°44.5	218°50.7	24°33.6	47°52.2	-22°35.8	17°43.9	-21°31.8
6	324°39.0	294°02.3	10°45.5	233°51.4	24°33.6	62°54.9	-22°35.8	32°46.4	-21°31.8
7	339°41.5	309°01.9	10°46.6	248°52.1	24°33.6	77°57.7	-22°35.8	47°49.0	-21°31.8
8	354°44.0	324°01.5	10°47.7	263°52.8	24°33.6	93°00.4	-22°35.8	62°51.5	-21°31.8
9	9°46.4	339°01.0	10°48.8	278°53.4	24°33.6	108°03.2	-22°35.8	77°54.0	-21°31.9
10	24°48.9	354°00.6	10°49.8	293°54.1	24°33.6	123°05.9	-22°35.8	92°56.6	-21°31.9
11	39°51.4	9°00.2	10°50.9	308°54.8	24°33.6	138°08.6	-22°35.8	107°59.1	-21°31.9
12	54°53.8	23°59.8	10°52.0	323°55.5	24°33.6	153°11.4	-22°35.7	123°01.6	-21°31.9
13	69°56.3	38°59.3	10°53.0	338°56.2	24°33.6	168°14.1	-22°35.7	138°04.2	-21°31.9
14	84°58.7	53°58.9	10°54.1	353°56.9	24°33.5	183°16.8	-22°35.7	153°06.7	-21°31.9
15	100°01.2	68°58.5	10°55.2	8°57.6	24°33.5	198°19.6	-22°35.7	168°09.3	-21°31.9
16	115°03.7	83°58.0	10°56.2	23°58.3	24°33.5	213°22.3	-22°35.7	183°11.8	-21°31.9
17	130°06.1	98°57.6	10°57.3	38°59.0	24°33.5	228°25.1	-22°35.7	198°14.3	-21°32.0
18	145°08.6	113°57.2	10°58.4	53°59.6	24°33.5	243°27.8	-22°35.7	213°16.9	-21°32.0
19	160°11.1	128°56.7	10°59.4	69°00.3	24°33.5	258°30.6	-22°35.7	228°19.4	-21°32.0
20	175°13.5	143°56.3	11°00.5	84°01.0	24°33.5	273°33.3	-22°35.6	243°21.9	-21°32.0
21	190°16.0	158°55.9	11°01.6	99°01.7	24°33.5	288°36.0	-22°35.6	258°24.5	-21°32.0
22	205°18.5	173°55.5	11°02.6	114°02.4	24°33.5	303°38.8	-22°35.6	273°27.0	-21°32.0
23	220°20.9	188°55.0	11°03.7	129°03.1	24°33.5	318°41.5	-22°35.6	288°29.6	-21°32.0
Mer.pass.:8:21:		v-0.4 d1.1 m-3.8		v0.7 d-0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	235°23.4	203°54.6	11°04.8	144°03.8	24°33.5	333°44.3	-22°35.6	303°32.1	-21°32.0
1	250°25.8	218°54.2	11°05.8	159°04.5	24°33.5	348°47.0	-22°35.6	318°34.6	-21°32.1
2	265°28.3	233°53.7	11°06.9	174°05.2	24°33.5	3°49.7	-22°35.6	333°37.2	-21°32.1
3	280°30.8	248°53.3	11°08.0	189°05.9	24°33.4	18°52.5	-22°35.6	348°39.7	-21°32.1
4	295°33.2	263°52.8	11°09.0	204°06.5	24°33.4	33°55.2	-22°35.5	3°42.3	-21°32.1
5	310°35.7	278°52.4	11°10.1	219°07.2	24°33.4	48°58.0	-22°35.5	18°44.8	-21°32.1
6	325°38.2	293°52.0	11°11.1	234°07.9	24°33.4	64°00.7	-22°35.5	33°47.3	-21°32.1
7	340°40.6	308°51.5	11°12.2	249°08.6	24°33.4	79°03.5	-22°35.5	48°49.9	-21°32.1
8	355°43.1	323°51.1	11°13.3	264°09.3	24°33.4	94°06.2	-22°35.5	63°52.4	-21°32.1
9	10°45.6	338°50.7	11°14.3	279°10.0	24°33.4	109°09.0	-22°35.5	78°55.0	-21°32.2
10	25°48.0	353°50.2	11°15.4	294°10.7	24°33.4	124°11.7	-22°35.5	93°57.5	-21°32.2
11	40°50.5	8°49.8	11°16.4	309°11.4	24°33.4	139°14.4	-22°35.5	109°00.0	-21°32.2
12	55°53.0	23°49.4	11°17.5	324°12.1	24°33.3	154°17.2	-22°35.4	124°02.6	-21°32.2
13	70°55.4	38°48.9	11°18.6	339°12.8	24°33.3	169°19.9	-22°35.4	139°05.1	-21°32.2
14	85°57.9	53°48.5	11°19.6	354°13.5	24°33.3	184°22.7	-22°35.4	154°07.7	-21°32.2
15	101°00.3	68°48.0	11°20.7	9°14.1	24°33.3	199°25.4	-22°35.4	169°10.2	-21°32.2
16	116°02.8	83°47.6	11°21.7	24°14.8	24°33.3	214°28.2	-22°35.4	184°12.7	-21°32.2
17	131°05.3	98°47.2	11°22.8	39°15.5	24°33.3	229°30.9	-22°35.4	199°15.3	-21°32.3
18	146°07.7	113°46.7	11°23.8	54°16.2	24°33.3	244°33.7	-22°35.4	214°17.8	-21°32.3
19	161°10.2	128°46.3	11°24.9	69°16.9	24°33.3	259°36.4	-22°35.4	229°20.4	-21°32.3
20	176°12.7	143°45.8	11°26.0	84°17.6	24°33.2	274°39.2	-22°35.3	244°22.9	-21°32.3
21	191°15.1	158°45.4	11°27.0	99°18.3	24°33.2	289°41.9	-22°35.3	259°25.5	-21°32.3
22	206°17.6	173°45.0	11°28.1	114°19.0	24°33.2	304°44.6	-22°35.3	274°28.0	-21°32.3
23	221°20.1	188°44.5	11°29.1	129°19.7	24°33.2	319°47.4	-22°35.3	289°30.5	-21°32.3
Mer.pass.:8:17:		v-0.4 d1.1 m-3.8		v0.7 d-0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.0	-42°12.1
Schedar	349°36.4	56°38.2
Diphda	348°52.0	-17°53.0
Achernar	335°24.3	-57°08.3
Hamal	327°56.6	23°33.0
Polaris	316°29.2	89°20.5
Akamar	315°15.7	-40°13.8
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.8	-52°42.7
Sirius	258°30.3	-16°44.6
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.8
Avior	234°16.6	-59°34.6
Suhail	222°49.6	-43°30.9
Miaplacidus	221°39.0	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.5	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.4	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.8	55°51.6
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.2
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.8
Zubenelg.	137°00.6	-16°07.2
Kochab	137°18.9	74°04.8
Alphecca	126°07.3	26°39.1
Antares	112°21.0	-26°28.3
Atria	107°18.6	-69°03.5
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°06.9
Rasalhague	96°02.4	12°32.8
Etamin	90°43.8	51°29.1
Kaus Aust.	83°38.2	-34°22.3
Vega	80°36.0	38°48.0
Nunki	75°53.1	-26°16.2
Altair	62°04.2	8°55.1
Peacock	53°12.7	-56°40.1
Deneb	49°28.6	45°20.7
Enif	33°43.2	9°57.7
Alnair	27°38.8	-46°51.8
Fomalhaut	15°19.7	-29°31.1
Scheat	13°49.6	28°11.0
Markab	13°34.5	15°18.3

2019/5/1	**SHA**	**Mer.pass**
Venus	330°49.9	10:23
Mars	270°05.6	14:25
Jupiter	98°07.8	01:53
Saturn	68°05.3	03:53

2019/5/1	**SHA**	**Mer.pass**
Venus	329°40.6	10:24
Mars	269°23.0	14:24
Jupiter	98°14.3	01:49
Saturn	68°07.0	03:49

2019/5/1	**SHA**	**Mer.pass**
Venus	328°31.2	10:25
Mars	268°40.4	14:23
Jupiter	98°20.9	01:45
Saturn	68°08.7	03:45

Horizontal paralax	
Venus:	0.1
Mars:	0.1

2019 May 16 to May. 18

h Thu	Sun GHA	Sun Dec	Moon GHA	ν	Dec	d	HP
0	180°54.4	18°58.9	35°29.1	10.6	-2°05.9	-13.4	59.2
1	195°54.4	18°59.5	49°58.8	10.6	-2°19.3	-13.4	59.1
2	210°54.4	19°00.0	64°28.4	10.6	-2°32.7	-13.3	59.1
3	225°54.4	19°00.6	78°58.0	10.6	-2°46.0	-13.3	59.1
4	240°54.4	19°01.2	93°27.6	10.6	-2°59.3	-13.3	59.1
5	255°54.3	19°01.8	107°57.2	10.6	-3°12.6	-13.3	59.1
6	270°54.3	19°02.4	122°26.8	10.6	-3°25.9	-13.3	59.1
7	285°54.3	19°02.9	136°56.4	10.6	-3°39.1	-13.2	59.1
8	300°54.3	19°03.5	151°26.0	10.6	-3°52.3	-13.2	59.1
9	315°54.3	19°04.1	165°55.6	10.6	-4°05.5	-13.2	59.1
10	330°54.3	19°04.7	180°25.2	10.6	-4°18.7	-13.2	59.0
11	345°54.3	19°05.3	194°54.8	10.6	-4°31.9	-13.1	59.0
12	0°54.3	19°05.8	209°24.4	10.6	-4°45.0	-13.1	59.0
13	15°54.3	19°06.4	223°54.0	10.6	-4°58.1	-13.1	59.0
14	30°54.2	19°07.0	238°23.5	10.6	-5°11.1	-13.0	59.0
15	45°54.2	19°07.6	252°53.1	10.5	-5°24.1	-13.0	59.0
16	60°54.2	19°08.1	267°22.6	10.5	-5°37.1	-13.0	59.0
17	75°54.2	19°08.7	281°52.2	10.5	-5°50.1	-12.9	58.9
18	90°54.2	19°09.3	296°21.7	10.5	-6°03.0	-12.9	58.9
19	105°54.2	19°09.9	310°51.2	10.5	-6°15.8	-12.9	58.9
20	120°54.2	19°10.4	325°20.7	10.5	-6°28.7	-12.8	58.9
21	135°54.2	19°11.0	339°50.2	10.5	-6°41.5	-12.8	58.9
22	150°54.1	19°11.6	354°19.7	10.5	-6°54.2	-12.7	58.9
23	165°54.1	19°12.1	8°49.1	10.5	-7°06.9	-12.7	58.8
	SD.=15.8	d=0.6			S.D.=16.1		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°54.1	19°12.7	23°18.6	10.4	-7°19.6	-12.6	58.8
1	195°54.1	19°13.3	37°48.0	10.4	-7°32.2	-12.6	58.8
2	210°54.1	19°13.9	52°17.4	10.4	-7°44.7	-12.5	58.8
3	225°54.1	19°14.4	66°46.8	10.4	-7°57.3	-12.5	58.8
4	240°54.1	19°15.0	81°16.2	10.4	-8°09.7	-12.4	58.8
5	255°54.0	19°15.6	95°45.6	10.4	-8°22.1	-12.4	58.7
6	270°54.0	19°16.1	110°14.9	10.3	-8°34.5	-12.3	58.7
7	285°54.0	19°16.7	124°44.3	10.3	-8°46.8	-12.3	58.7
8	300°54.0	19°17.3	139°13.6	10.3	-8°59.1	-12.2	58.7
9	315°54.0	19°17.8	153°42.9	10.3	-9°11.3	-12.2	58.7
10	330°54.0	19°18.4	168°12.2	10.3	-9°23.4	-12.1	58.7
11	345°53.9	19°18.9	182°41.4	10.3	-9°35.5	-12.1	58.6
12	0°53.9	19°19.5	197°10.7	10.2	-9°47.5	-12.0	58.6
13	15°53.9	19°20.1	211°39.9	10.2	-9°59.5	-11.9	58.6
14	30°53.9	19°20.6	226°09.1	10.2	-10°11.4	-11.9	58.6
15	45°53.9	19°21.2	240°38.3	10.2	-10°23.2	-11.8	58.6
16	60°53.8	19°21.8	255°07.4	10.2	-10°35.0	-11.7	58.5
17	75°53.8	19°22.3	269°36.6	10.1	-10°46.7	-11.7	58.5
18	90°53.8	19°22.9	284°05.7	10.1	-10°58.3	-11.6	58.5
19	105°53.8	19°23.4	298°34.8	10.1	-11°09.9	-11.5	58.5
20	120°53.8	19°24.0	313°03.9	10.1	-11°21.4	-11.5	58.5
21	135°53.8	19°24.6	327°32.9	10.0	-11°32.9	-11.4	58.4
22	150°53.7	19°25.1	342°01.9	10.0	-11°44.2	-11.3	58.4
23	165°53.7	19°25.7	356°30.9	10.0	-11°55.5	-11.3	58.4
	SD.=15.8	d=0.6			S.D.=16.1		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°53.7	19°26.2	10°59.9	10.0	-12°06.7	-11.2	58.4
1	195°53.7	19°26.8	25°28.9	10.0	-12°17.9	-11.1	58.4
2	210°53.7	19°27.3	39°57.8	9.9	-12°28.9	-11.0	58.3
3	225°53.6	19°27.9	54°26.8	9.9	-12°39.9	-11.0	58.3
4	240°53.6	19°28.4	68°55.6	9.9	-12°50.8	-10.9	58.3
5	255°53.6	19°29.0	83°24.5	9.9	-13°01.7	-10.8	58.3
6	270°53.6	19°29.6	97°53.4	9.8	-13°12.4	-10.7	58.2
7	285°53.5	19°30.1	112°22.2	9.8	-13°23.1	-10.6	58.2
8	300°53.5	19°30.7	126°51.0	9.8	-13°33.7	-10.6	58.2
9	315°53.5	19°31.2	141°19.7	9.8	-13°44.2	-10.5	58.2
10	330°53.5	19°31.8	155°48.5	9.7	-13°54.6	-10.4	58.2
11	345°53.5	19°32.3	170°17.2	9.7	-14°05.0	-10.3	58.1
12	0°53.4	19°32.9	184°45.9	9.7	-14°15.2	-10.2	58.1
13	15°53.4	19°33.4	199°14.6	9.7	-14°25.4	-10.1	58.1
14	30°53.4	19°34.0	213°43.3	9.6	-14°35.5	-10.0	58.1
15	45°53.4	19°34.5	228°11.9	9.6	-14°45.5	-9.9	58.0
16	60°53.3	19°35.1	242°40.5	9.6	-14°55.4	-9.9	58.0
17	75°53.3	19°35.6	257°09.1	9.6	-15°05.2	-9.8	58.0
18	90°53.3	19°36.1	271°37.6	9.5	-15°14.9	-9.7	58.0
19	105°53.3	19°36.7	286°06.2	9.5	-15°24.5	-9.6	57.9
20	120°53.2	19°37.2	300°34.7	9.5	-15°34.0	-9.5	57.9
21	135°53.2	19°37.8	315°03.2	9.5	-15°43.5	-9.4	57.9
22	150°53.2	19°38.3	329°31.6	9.5	-15°52.8	-9.3	57.9
23	165°53.2	19°38.9	344°00.1	9.4	-16°02.1	-9.2	57.8
	SD.=15.8	d=0.6			S.D.=15.9		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:38	22:20	–:–	–:–
66	–:–	–:–	02:16	21:41	–:–	–:–
64	–:–	00:55	02:42	21:13	23:06	–:–
62	–:–	01:44	03:02	20:53	22:13	–:–
60	–:–	02:14	03:19	20:36	21:42	–:–
58	00:49	02:36	03:32	20:22	21:19	23:11
56	01:34	02:54	03:44	20:10	21:01	22:22
54	02:01	03:09	03:55	19:59	20:46	21:54
52	02:22	03:21	04:04	19:50	20:33	21:32
50	02:39	03:32	04:12	19:42	20:22	21:15
45	03:11	03:55	04:29	19:24	19:59	20:43
40	03:34	04:13	04:43	19:10	19:41	20:19
35	03:53	04:27	04:55	18:58	19:26	20:01
30	04:08	04:39	05:06	18:47	19:14	19:45
20	04:32	04:60	05:23	18:30	18:53	19:21
10	04:50	05:16	05:39	18:14	18:37	19:03
0	05:06	05:31	05:53	17:60	18:22	18:47
-10	05:19	05:45	06:07	17:46	18:08	18:34
-20	05:32	05:59	06:22	17:31	17:54	18:21
-30	05:44	06:13	06:39	17:14	17:39	18:08
-35	05:51	06:22	06:49	17:04	17:31	18:02
-40	05:58	06:31	06:60	16:53	17:22	17:55
-45	06:05	06:41	07:13	16:39	17:11	17:47
-50	06:13	06:53	07:29	16:23	16:59	17:39
-52	06:17	06:59	07:36	16:16	16:54	17:35
-54	06:21	07:05	07:45	16:07	16:48	17:31
-56	06:25	07:11	07:54	15:58	16:41	17:27
-58	06:30	07:19	08:05	15:47	16:34	17:23
-60	06:34	07:27	08:17	15:35	16:25	17:18

Lat.	Moonrise Thu	Moonrise Fri	Moonrise Sat	Moonset Thu	Moonset Fri	Moonset Sat
72	17:30	19:41	22:11	03:08	02:49	02:25
70	17:21	19:21	21:27	03:12	03:01	02:48
68	17:14	19:05	20:58	03:15	03:10	03:05
66	17:08	18:52	20:37	03:18	03:18	03:19
64	17:02	18:41	20:20	03:20	03:25	03:31
62	16:58	18:32	20:06	03:22	03:31	03:41
60	16:54	18:25	19:54	03:24	03:36	03:50
58	16:51	18:18	19:44	03:26	03:41	03:57
56	16:48	18:12	19:35	03:27	03:45	04:04
54	16:45	18:07	19:27	03:28	03:48	04:10
52	16:43	18:02	19:20	03:29	03:52	04:16
50	16:40	17:58	19:14	03:30	03:55	04:21
45	16:36	17:49	19:00	03:33	04:01	04:31
40	16:32	17:41	18:49	03:35	04:07	04:40
35	16:28	17:34	18:40	03:37	04:11	04:48
30	16:25	17:29	18:32	03:38	04:16	04:55
20	16:20	17:19	18:18	03:41	04:23	05:07
10	16:16	17:10	18:05	03:43	04:29	05:17
0	16:11	17:02	17:54	03:45	04:36	05:27
-10	16:07	16:54	17:42	03:47	04:42	05:36
-20	16:03	16:46	17:30	03:49	04:48	05:47
-30	15:58	16:36	17:17	03:52	04:56	05:59
-35	15:55	16:31	17:09	03:54	04:60	06:06
-40	15:52	16:25	16:60	03:55	05:05	06:14
-45	15:49	16:18	16:49	03:57	05:10	06:23
-50	15:44	16:09	16:37	03:59	05:17	06:34
-52	15:42	16:05	16:31	04:01	05:20	06:39
-54	15:40	16:01	16:25	04:02	05:24	06:45
-56	15:38	15:56	16:18	04:03	05:28	06:52
-58	15:35	15:51	16:10	04:04	05:32	06:59
-60	15:32	15:45	16:01	04:06	05:37	07:07

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
16	03:38	03:37	11:56	22:23	09:58	12(93%)
17	03:36	03:36	11:56	23:14	10:48	13(97%)
18	03:35	03:34	11:56	00:06	11:40	14(100%)

May 19, 20 ,21 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	236°22.5	203°44.1	11°30.2	144°20.4	24°33.2	334°50.1	-22°35.3	304°33.1	-21°32.3
1	251°25.0	218°43.6	11°31.2	159°21.1	24°33.2	349°52.9	-22°35.3	319°35.6	-21°32.4
2	266°27.5	233°43.2	11°32.3	174°21.7	24°33.1	4°55.6	-22°35.3	334°38.2	-21°32.4
3	281°29.9	248°42.8	11°33.3	189°22.4	24°33.1	19°58.4	-22°35.3	349°40.7	-21°32.4
4	296°32.4	263°42.3	11°34.4	204°23.1	24°33.1	35°01.1	-22°35.2	4°43.3	-21°32.4
5	311°34.8	278°41.9	11°35.4	219°23.8	24°33.1	50°03.9	-22°35.2	19°45.8	-21°32.4
6	326°37.3	293°41.4	11°36.5	234°24.5	24°33.1	65°06.6	-22°35.2	34°48.3	-21°32.4
7	341°39.8	308°41.0	11°37.5	249°25.2	24°33.0	80°09.4	-22°35.2	49°50.9	-21°32.4
8	356°42.2	323°40.5	11°38.6	264°25.9	24°33.0	95°12.1	-22°35.2	64°53.4	-21°32.5
9	11°44.7	338°40.1	11°39.6	279°26.6	24°33.0	110°14.9	-22°35.2	79°56.0	-21°32.5
10	26°47.2	353°39.6	11°40.7	294°27.3	24°33.0	125°17.6	-22°35.2	94°58.5	-21°32.5
11	41°49.6	8°39.2	11°41.7	309°28.0	24°33.0	140°20.4	-22°35.2	110°01.1	-21°32.5
12	56°52.1	23°38.7	11°42.8	324°28.7	24°32.9	155°23.1	-22°35.1	125°03.6	-21°32.5
13	71°54.6	38°38.3	11°43.8	339°29.3	24°32.9	170°25.9	-22°35.1	140°06.2	-21°32.5
14	86°57.0	53°37.9	11°44.9	354°30.0	24°32.9	185°28.6	-22°35.1	155°08.7	-21°32.5
15	101°59.5	68°37.4	11°45.9	9°30.7	24°32.9	200°31.4	-22°35.1	170°11.3	-21°32.5
16	117°02.0	83°37.0	11°47.0	24°31.4	24°32.9	215°34.1	-22°35.1	185°13.8	-21°32.6
17	132°04.4	98°36.5	11°48.0	39°32.1	24°32.8	230°36.9	-22°35.1	200°16.3	-21°32.6
18	147°06.9	113°36.1	11°49.1	54°32.8	24°32.8	245°39.6	-22°35.1	215°18.9	-21°32.6
19	162°09.3	128°35.6	11°50.1	69°33.5	24°32.8	260°42.4	-22°35.0	230°21.4	-21°32.6
20	177°11.8	143°35.2	11°51.2	84°34.2	24°32.8	275°45.1	-22°35.0	245°24.0	-21°32.6
21	192°14.3	158°34.7	11°52.2	99°34.9	24°32.7	290°47.9	-22°35.0	260°26.5	-21°32.6
22	207°16.7	173°34.3	11°53.2	114°35.6	24°32.7	305°50.6	-22°35.0	275°29.1	-21°32.6
23	222°19.2	188°33.8	11°54.3	129°36.3	24°32.7	320°53.4	-22°35.0	290°31.6	-21°32.7
Mer.pass.:8:13:		v-0.4 d1.1 m-3.8		v0.7 d-0.0 m1.7		v2.7 d0.0 m-2.4		v2.5 d-0.0 m0.4	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	237°21.7	203°33.4	11°55.3	144°37.0	24°32.7	335°56.1	-22°35.0	305°34.2	-21°32.7
1	252°24.1	218°32.9	11°56.4	159°37.6	24°32.7	350°58.9	-22°35.0	320°36.7	-21°32.7
2	267°26.6	233°32.5	11°57.4	174°38.3	24°32.6	6°01.7	-22°35.0	335°39.3	-21°32.7
3	282°29.1	248°32.0	11°58.5	189°39.0	24°32.6	21°04.4	-22°34.9	350°41.8	-21°32.7
4	297°31.5	263°31.6	11°59.5	204°39.7	24°32.6	36°07.2	-22°34.9	5°44.4	-21°32.7
5	312°34.0	278°31.1	12°00.5	219°40.4	24°32.5	51°09.9	-22°34.9	20°46.9	-21°32.7
6	327°36.4	293°30.6	12°01.6	234°41.1	24°32.5	66°12.7	-22°34.9	35°49.5	-21°32.8
7	342°38.9	308°30.2	12°02.6	249°41.8	24°32.5	81°15.4	-22°34.9	50°52.0	-21°32.8
8	357°41.4	323°29.7	12°03.7	264°42.5	24°32.5	96°18.2	-22°34.9	65°54.6	-21°32.8
9	12°43.8	338°29.3	12°04.7	279°43.2	24°32.4	111°20.9	-22°34.9	80°57.1	-21°32.8
10	27°46.3	353°28.8	12°05.7	294°43.9	24°32.4	126°23.7	-22°34.9	95°59.6	-21°32.8
11	42°48.8	8°28.4	12°06.8	309°44.6	24°32.4	141°26.4	-22°34.8	111°02.2	-21°32.8
12	57°51.2	23°27.9	12°07.8	324°45.3	24°32.4	156°29.2	-22°34.8	126°04.7	-21°32.8
13	72°53.7	38°27.5	12°08.9	339°46.0	24°32.3	171°31.9	-22°34.8	141°07.3	-21°32.8
14	87°56.2	53°27.0	12°09.9	354°46.6	24°32.3	186°34.7	-22°34.8	156°09.8	-21°32.9
15	102°58.6	68°26.5	12°10.9	9°47.3	24°32.3	201°37.5	-22°34.8	171°12.4	-21°32.9
16	118°01.1	83°26.1	12°12.0	24°48.0	24°32.2	216°40.2	-22°34.8	186°14.9	-21°32.9
17	133°03.6	98°25.6	12°13.0	39°48.7	24°32.2	231°43.0	-22°34.8	201°17.5	-21°32.9
18	148°06.0	113°25.2	12°14.0	54°49.4	24°32.2	246°45.7	-22°34.7	216°20.0	-21°32.9
19	163°08.5	128°24.7	12°15.1	69°50.1	24°32.1	261°48.5	-22°34.7	231°22.6	-21°32.9
20	178°10.9	143°24.3	12°16.1	84°50.8	24°32.1	276°51.2	-22°34.7	246°25.1	-21°32.9
21	193°13.4	158°23.8	12°17.1	99°51.5	24°32.1	291°54.0	-22°34.7	261°27.7	-21°33.0
22	208°15.9	173°23.3	12°18.2	114°52.2	24°32.1	306°56.8	-22°34.7	276°30.2	-21°33.0
23	223°18.3	188°22.9	12°19.2	129°52.9	24°32.0	321°59.5	-22°34.7	291°32.8	-21°33.0
Mer.pass.:8:09:		v-0.5 d1.0 m-3.8		v0.7 d-0.0 m1.7		v2.8 d0.0 m-2.4		v2.5 d-0.0 m0.3	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	238°20.8	203°22.4	12°20.2	144°53.6	24°32.0	337°02.3	-22°34.7	306°35.3	-21°33.0
1	253°23.3	218°22.0	12°21.3	159°54.3	24°32.0	352°05.0	-22°34.7	321°37.9	-21°33.0
2	268°25.7	233°21.5	12°22.3	174°55.0	24°31.9	7°07.8	-22°34.6	336°40.4	-21°33.0
3	283°28.2	248°21.0	12°23.3	189°55.7	24°31.9	22°10.5	-22°34.6	351°43.0	-21°33.0
4	298°30.7	263°20.6	12°24.4	204°56.4	24°31.9	37°13.3	-22°34.6	6°45.5	-21°33.1
5	313°33.1	278°20.1	12°25.4	219°57.0	24°31.8	52°16.1	-22°34.6	21°48.1	-21°33.1
6	328°35.6	293°19.7	12°26.4	234°57.7	24°31.8	67°18.8	-22°34.6	36°50.7	-21°33.1
7	343°38.1	308°19.2	12°27.4	249°58.4	24°31.7	82°21.6	-22°34.6	51°53.2	-21°33.1
8	358°40.5	323°18.7	12°28.5	264°59.1	24°31.7	97°24.3	-22°34.6	66°55.8	-21°33.1
9	13°43.0	338°18.3	12°29.5	279°59.8	24°31.7	112°27.1	-22°34.5	81°58.3	-21°33.1
10	28°45.4	353°17.8	12°30.5	295°00.5	24°31.6	127°29.8	-22°34.5	97°00.9	-21°33.1
11	43°47.9	8°17.3	12°31.6	310°01.2	24°31.6	142°32.6	-22°34.5	112°03.4	-21°33.2
12	58°50.4	23°16.9	12°32.6	325°01.9	24°31.6	157°35.4	-22°34.5	127°06.0	-21°33.2
13	73°52.8	38°16.4	12°33.6	340°02.6	24°31.5	172°38.1	-22°34.5	142°08.5	-21°33.2
14	88°55.3	53°15.9	12°34.6	355°03.3	24°31.5	187°40.9	-22°34.5	157°11.1	-21°33.2
15	103°57.8	68°15.5	12°35.7	10°04.0	24°31.5	202°43.6	-22°34.5	172°13.6	-21°33.2
16	119°00.2	83°15.0	12°36.7	25°04.7	24°31.4	217°46.4	-22°34.5	187°16.2	-21°33.2
17	134°02.7	98°14.5	12°37.7	40°05.4	24°31.4	232°49.2	-22°34.4	202°18.7	-21°33.2
18	149°05.2	113°14.1	12°38.7	55°06.1	24°31.3	247°51.9	-22°34.4	217°21.3	-21°33.3
19	164°07.6	128°13.6	12°39.8	70°06.8	24°31.3	262°54.7	-22°34.4	232°23.8	-21°33.3
20	179°10.1	143°13.1	12°40.8	85°07.5	24°31.3	277°57.5	-22°34.4	247°26.4	-21°33.3
21	194°12.6	158°12.7	12°41.8	100°08.1	24°31.2	293°00.2	-22°34.4	262°28.9	-21°33.3
22	209°15.0	173°12.2	12°42.8	115°08.8	24°31.2	308°03.0	-22°34.4	277°31.5	-21°33.3
23	224°17.5	188°11.7	12°43.8	130°09.5	24°31.1	323°05.7	-22°34.4	292°34.1	-21°33.3
Mer.pass.:8:05:		v-0.5 d1.0 m-3.8		v0.7 d-0.0 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Stars

	SHA	Dec
Alpheratz	357°39.6	29°11.5
Ankaa	353°12.0	-42°12.0
Schedar	349°36.3	56°38.2
Diphda	348°52.0	-17°52.9
Achernar	335°24.3	-57°08.3
Hamal	327°56.6	23°33.0
Polaris	316°28.6	89°20.5
Akamar	315°15.7	-40°13.8
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.8	-52°42.7
Sirius	258°30.4	-16°44.6
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.7
Avior	234°16.7	-59°34.6
Suhail	222°49.6	-43°30.9
Miaplacidus	221°39.1	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.6	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.4	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.8	55°51.6
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.2
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.8
Zubenelg.	137°00.6	-16°07.2
Kochab	137°18.9	74°04.8
Alphecca	126°07.2	26°39.1
Antares	112°20.9	-26°28.3
Atria	107°18.6	-69°03.5
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°06.9
Rasalhague	96°02.4	12°32.8
Etamin	90°43.8	51°29.1
Kaus Aust.	83°38.1	-34°22.3
Vega	80°35.9	38°48.0
Nunki	75°53.1	-26°16.2
Altair	62°04.2	8°55.1
Peacock	53°12.7	-56°40.1
Deneb	49°28.6	45°20.7
Enif	33°43.2	9°57.7
Alnair	27°38.7	-46°51.8
Fomalhaut	15°19.7	-29°31.1
Scheat	13°49.6	28°11.0
Markab	13°34.4	15°18.3

2019/5/1	SHA	Mer.pass
Venus	327°21.6	10:25
Mars	267°57.8	14:22
Jupiter	98°27.6	01:40
Saturn	68°10.6	03:41

2019/5/2	SHA	Mer.pass
Venus	326°11.7	10:26
Mars	267°15.3	14:21
Jupiter	98°34.5	01:36
Saturn	68°12.5	03:37

2019/5/2	SHA	Mer.pass
Venus	325°01.6	10:27
Mars	266°32.8	14:20
Jupiter	98°41.5	01:32
Saturn	68°14.5	03:33

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°53.1	19°39.4	358°28.5	9.4	-16°11.2	-9.1	57.8
1	195°53.1	19°39.9	12°56.9	9.4	-16°20.3	-9.0	57.8
2	210°53.1	19°40.5	27°25.3	9.4	-16°29.2	-8.9	57.8
3	225°53.1	19°41.0	41°53.6	9.3	-16°38.1	-8.8	57.7
4	240°53.0	19°41.6	56°22.0	9.3	-16°46.8	-8.7	57.7
5	255°53.0	19°42.1	70°50.3	9.3	-16°55.5	-8.6	57.7
6	270°53.0	19°42.6	85°18.6	9.3	-17°04.0	-8.5	57.7
7	285°53.0	19°43.2	99°46.8	9.3	-17°12.5	-8.4	57.6
8	300°52.9	19°43.7	114°15.1	9.2	-17°20.8	-8.3	57.6
9	315°52.9	19°44.3	128°43.3	9.2	-17°29.0	-8.2	57.6
10	330°52.9	19°44.8	143°11.5	9.2	-17°37.2	-8.1	57.6
11	345°52.8	19°45.3	157°39.7	9.2	-17°45.2	-8.0	57.5
12	0°52.8	19°45.9	172°07.9	9.2	-17°53.1	-7.9	57.5
13	15°52.8	19°46.4	186°36.0	9.1	-18°00.9	-7.8	57.5
14	30°52.8	19°46.9	201°04.2	9.1	-18°08.6	-7.7	57.4
15	45°52.7	19°47.5	215°32.3	9.1	-18°16.2	-7.5	57.4
16	60°52.7	19°48.0	230°00.4	9.1	-18°23.7	-7.4	57.4
17	75°52.7	19°48.5	244°28.5	9.1	-18°31.1	-7.3	57.4
18	90°52.6	19°49.1	258°56.6	9.1	-18°38.4	-7.2	57.3
19	105°52.6	19°49.6	273°24.6	9.0	-18°45.5	-7.1	57.3
20	120°52.6	19°50.1	287°52.7	9.0	-18°52.6	-7.0	57.3
21	135°52.5	19°50.7	302°20.7	9.0	-18°59.5	-6.9	57.3
22	150°52.5	19°51.2	316°48.7	9.0	-19°06.3	-6.8	57.2
23	165°52.5	19°51.7	331°16.7	9.0	-19°13.0	-6.7	57.2
	SD.=15.8	d=0.5			S.D.=15.8		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°52.5	19°52.3	345°44.7	9.0	-19°19.6	-6.5	57.2
1	195°52.4	19°52.8	0°12.7	9.0	-19°26.1	-6.4	57.1
2	210°52.4	19°53.3	14°40.6	9.0	-19°32.5	-6.3	57.1
3	225°52.4	19°53.8	29°08.6	9.0	-19°38.7	-6.2	57.1
4	240°52.3	19°54.4	43°36.6	8.9	-19°44.8	-6.1	57.1
5	255°52.3	19°54.9	58°04.5	8.9	-19°50.9	-6.0	57.0
6	270°52.3	19°55.4	72°32.4	8.9	-19°56.8	-5.8	57.0
7	285°52.2	19°55.9	87°00.3	8.9	-20°02.6	-5.7	57.0
8	300°52.2	19°56.5	101°28.3	8.9	-20°08.2	-5.6	57.0
9	315°52.2	19°57.0	115°56.2	8.9	-20°13.8	-5.5	56.9
10	330°52.1	19°57.5	130°24.1	8.9	-20°19.2	-5.4	56.9
11	345°52.1	19°58.0	144°52.0	8.9	-20°24.5	-5.3	56.9
12	0°52.1	19°58.5	159°19.9	8.9	-20°29.7	-5.1	56.8
13	15°52.0	19°59.1	173°47.8	8.9	-20°34.8	-5.0	56.8
14	30°52.0	19°59.6	188°15.7	8.9	-20°39.7	-4.9	56.8
15	45°52.0	20°00.1	202°43.6	8.9	-20°44.6	-4.8	56.8
16	60°51.9	20°00.6	217°11.4	8.9	-20°49.3	-4.7	56.7
17	75°51.9	20°01.1	231°39.3	8.9	-20°53.9	-4.5	56.7
18	90°51.8	20°01.7	246°07.2	8.9	-20°58.4	-4.4	56.7
19	105°51.8	20°02.2	260°35.1	8.9	-21°02.7	-4.3	56.6
20	120°51.8	20°02.7	275°03.0	8.9	-21°07.0	-4.2	56.6
21	135°51.7	20°03.2	289°30.9	8.9	-21°11.1	-4.1	56.6
22	150°51.7	20°03.7	303°58.8	8.9	-21°15.1	-3.9	56.6
23	165°51.7	20°04.2	318°26.7	8.9	-21°18.9	-3.8	56.5
	SD.=15.8	d=0.5			S.D.=15.6		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°51.6	20°04.8	332°54.7	8.9	-21°22.7	-3.7	56.5
1	195°51.6	20°05.3	347°22.6	8.9	-21°26.3	-3.6	56.5
2	210°51.6	20°05.8	1°50.5	8.9	-21°29.8	-3.4	56.5
3	225°51.5	20°06.3	16°18.4	8.9	-21°33.2	-3.3	56.4
4	240°51.5	20°06.8	30°46.4	9.0	-21°36.5	-3.2	56.4
5	255°51.4	20°07.3	45°14.4	9.0	-21°39.6	-3.1	56.4
6	270°51.4	20°07.8	59°42.3	9.0	-21°42.6	-3.0	56.3
7	285°51.4	20°08.3	74°10.3	9.0	-21°45.5	-2.8	56.3
8	300°51.3	20°08.9	88°38.3	9.0	-21°48.3	-2.7	56.3
9	315°51.3	20°09.4	103°06.3	9.0	-21°51.0	-2.6	56.3
10	330°51.2	20°09.9	117°34.3	9.0	-21°53.5	-2.5	56.2
11	345°51.2	20°10.4	132°02.4	9.0	-21°55.9	-2.4	56.2
12	0°51.2	20°10.9	146°30.4	9.1	-21°58.2	-2.2	56.2
13	15°51.1	20°11.4	160°58.5	9.1	-22°00.4	-2.1	56.2
14	30°51.1	20°11.9	175°26.6	9.1	-22°02.4	-2.0	56.1
15	45°51.0	20°12.4	189°54.7	9.1	-22°04.4	-1.9	56.1
16	60°51.0	20°12.9	204°22.9	9.1	-22°06.2	-1.7	56.1
17	75°51.0	20°13.4	218°51.0	9.2	-22°07.9	-1.6	56.0
18	90°50.9	20°13.9	233°19.2	9.2	-22°09.4	-1.5	56.0
19	105°50.9	20°14.4	247°47.4	9.2	-22°10.9	-1.4	56.0
20	120°50.8	20°14.9	262°15.6	9.2	-22°12.2	-1.3	56.0
21	135°50.8	20°15.4	276°43.9	9.3	-22°13.4	-1.1	55.9
22	150°50.7	20°15.9	291°12.1	9.3	-22°14.5	-1.0	55.9
23	165°50.7	20°16.4	305°40.4	9.3	-22°15.4	-0.9	55.9
	SD.=15.8	d=0.5			S.D.=15.4		

	Twilight					Twilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:19	22:40	–:–	–:–
66	–:–	–:–	02:04	21:53	–:–	–:–
64	–:–	00:20	02:33	21:23	–:–	–:–
62	–:–	01:31	02:54	21:01	22:27	–:–
60	–:–	02:04	03:12	20:43	21:52	–:–
58	00:18	02:28	03:27	20:28	21:27	–:–
56	01:22	02:47	03:39	20:15	21:08	22:35
54	01:53	03:03	03:50	20:04	20:52	22:03
52	02:15	03:16	03:60	19:54	20:38	21:40
50	02:33	03:28	04:08	19:46	20:26	21:21
45	03:07	03:51	04:26	19:27	20:02	20:47
40	03:31	04:10	04:41	19:13	19:44	20:23
35	03:50	04:25	04:53	19:00	19:29	20:03
30	04:06	04:38	05:04	18:49	19:16	19:48
20	04:30	04:59	05:22	18:31	18:55	19:23
10	04:49	05:16	05:38	18:15	18:37	19:04
0	05:05	05:31	05:53	18:00	18:22	18:48
-10	05:20	05:45	06:08	17:45	18:08	18:33
-20	05:33	05:60	06:23	17:30	17:53	18:20
-30	05:46	06:15	06:41	17:12	17:38	18:07
-35	05:53	06:24	06:51	17:02	17:29	17:60
-40	06:00	06:33	07:03	16:50	17:20	17:53
-45	06:08	06:44	07:16	16:36	17:09	17:45
-50	06:17	06:57	07:33	16:20	16:56	17:36
-52	06:21	07:02	07:41	16:12	16:50	17:32
-54	06:25	07:09	07:49	16:03	16:44	17:28
-56	06:29	07:16	07:59	15:53	16:37	17:23
-58	06:34	07:24	08:10	15:42	16:29	17:18
-60	06:39	07:32	08:23	15:29	16:20	17:13

		Moonrise			Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	01:44	–:–	–:–
70	–:–	00:01	–:–	02:29	01:46	–:–
68	22:56	–:–	01:02	02:60	02:52	02:37
66	22:20	23:57	–:–	03:22	03:28	03:43
64	21:55	23:22	–:–	03:40	03:54	04:18
62	21:35	22:56	–:–	03:55	04:14	04:44
60	21:19	22:37	23:41	04:07	04:31	05:04
58	21:06	22:20	23:23	04:18	04:45	05:21
56	20:54	22:06	23:08	04:28	04:57	05:35
54	20:44	21:54	22:55	04:36	05:08	05:47
52	20:35	21:44	22:44	04:44	05:17	05:58
50	20:27	21:34	22:34	04:50	05:26	06:07
45	20:10	21:15	22:13	05:05	05:43	06:27
40	19:56	20:58	21:56	05:17	05:58	06:44
35	19:44	20:45	21:42	05:28	06:11	06:58
30	19:34	20:33	21:29	05:37	06:22	07:10
20	19:16	20:13	21:08	05:52	06:40	07:30
10	19:01	19:56	20:50	06:06	06:57	07:48
0	18:46	19:40	20:33	06:19	07:12	08:05
-10	18:32	19:23	20:15	06:32	07:27	08:22
-20	18:17	19:06	19:57	06:46	07:44	08:40
-30	17:60	18:46	19:36	07:01	08:02	09:01
-35	17:50	18:35	19:24	07:11	08:14	09:13
-40	17:39	18:22	19:10	07:21	08:26	09:27
-45	17:25	18:06	18:53	07:34	08:41	09:43
-50	17:09	17:47	18:33	07:49	08:60	10:03
-52	17:02	17:38	18:23	07:56	09:08	10:13
-54	16:53	17:28	18:12	08:04	09:18	10:24
-56	16:44	17:17	17:59	08:13	09:29	10:36
-58	16:33	17:04	17:45	08:23	09:42	10:51
-60	16:21	16:49	17:28	08:35	09:56	11:08

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	03:33	03:31	11:56	00:06	12:32	15(99%)
20	03:30	03:28	11:56	00:59	13:25	16(97%)
21	03:27	03:25	11:56	01:52	14:18	17(92%)

May 22, 23 ,24 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	239°19.9	203°11.3	12°44.9	145°10.2	24°31.1	338°08.5	-22°34.3	307°36.6	-21°33.4
1	254°22.4	218°10.8	12°45.9	160°10.9	24°31.1	353°11.3	-22°34.3	322°39.2	-21°33.4
2	269°24.9	233°10.3	12°46.9	175°11.6	24°31.0	8°14.0	-22°34.3	337°41.7	-21°33.4
3	284°27.3	248°09.8	12°47.9	190°12.3	24°31.0	23°16.8	-22°34.3	352°44.3	-21°33.4
4	299°29.8	263°09.4	12°48.9	205°13.0	24°30.9	38°19.5	-22°34.3	7°46.8	-21°33.4
5	314°32.3	278°08.9	12°50.0	220°13.7	24°30.9	53°22.3	-22°34.3	22°49.4	-21°33.4
6	329°34.7	293°08.4	12°51.0	235°14.4	24°30.9	68°25.1	-22°34.3	37°51.9	-21°33.4
7	344°37.2	308°08.0	12°52.0	250°15.1	24°30.8	83°27.8	-22°34.2	52°54.5	-21°33.5
8	359°39.7	323°07.5	12°53.0	265°15.8	24°30.8	98°30.6	-22°34.2	67°57.1	-21°33.5
9	14°42.1	338°07.0	12°54.0	280°16.5	24°30.7	113°33.4	-22°34.2	82°59.6	-21°33.5
10	29°44.6	353°06.5	12°55.0	295°17.2	24°30.7	128°36.1	-22°34.2	98°02.2	-21°33.5
11	44°47.1	8°06.1	12°56.0	310°17.9	24°30.6	143°38.9	-22°34.2	113°04.7	-21°33.5
12	59°49.5	23°05.6	12°57.1	325°18.6	24°30.6	158°41.7	-22°34.2	128°07.3	-21°33.5
13	74°52.0	38°05.1	12°58.1	340°19.3	24°30.5	173°44.4	-22°34.2	143°09.8	-21°33.5
14	89°54.4	53°04.6	12°59.1	355°20.0	24°30.5	188°47.2	-22°34.1	158°12.4	-21°33.6
15	104°56.9	68°04.2	13°00.1	10°20.7	24°30.5	203°50.0	-22°34.1	173°14.9	-21°33.6
16	119°59.4	83°03.7	13°01.1	25°21.3	24°30.4	218°52.7	-22°34.1	188°17.5	-21°33.6
17	135°01.8	98°03.2	13°02.1	40°22.0	24°30.4	233°55.5	-22°34.1	203°20.1	-21°33.6
18	150°04.3	113°02.7	13°03.1	55°22.7	24°30.3	248°58.2	-22°34.1	218°22.6	-21°33.6
19	165°06.8	128°02.3	13°04.1	70°23.4	24°30.3	264°01.0	-22°34.1	233°25.2	-21°33.6
20	180°09.2	143°01.8	13°05.2	85°24.1	24°30.2	279°03.8	-22°34.1	248°27.7	-21°33.7
21	195°11.7	158°01.3	13°06.2	100°24.8	24°30.2	294°06.5	-22°34.1	263°30.3	-21°33.7
22	210°14.2	173°00.8	13°07.2	115°25.5	24°30.1	309°09.3	-22°34.0	278°32.9	-21°33.7
23	225°16.6	188°00.3	13°08.2	130°26.2	24°30.1	324°12.1	-22°34.0	293°35.4	-21°33.7
Mer.pass.:8:01:		v-0.5 d1.0 m-3.8		v0.7 d-0.0 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	240°19.1	202°59.9	13°09.2	145°26.9	24°30.0	339°14.8	-22°34.0	308°38.0	-21°33.7
1	255°21.5	217°59.4	13°10.2	160°27.6	24°30.0	354°17.6	-22°34.0	323°40.5	-21°33.7
2	270°24.0	232°58.9	13°11.2	175°28.3	24°29.9	9°20.4	-22°34.0	338°43.1	-21°33.7
3	285°26.5	247°58.4	13°12.2	190°29.0	24°29.9	24°23.1	-22°34.0	353°45.6	-21°33.8
4	300°28.9	262°57.9	13°13.2	205°29.7	24°29.8	39°25.9	-22°34.0	8°48.2	-21°33.8
5	315°31.4	277°57.5	13°14.2	220°30.4	24°29.8	54°28.7	-22°33.9	23°50.8	-21°33.8
6	330°33.9	292°57.0	13°15.2	235°31.1	24°29.7	69°31.4	-22°33.9	38°53.3	-21°33.8
7	345°36.3	307°56.5	13°16.2	250°31.8	24°29.7	84°34.2	-22°33.9	53°55.9	-21°33.8
8	0°38.8	322°56.0	13°17.2	265°32.5	24°29.6	99°37.0	-22°33.9	68°58.4	-21°33.8
9	15°41.3	337°55.5	13°18.2	280°33.2	24°29.6	114°39.7	-22°33.9	84°01.0	-21°33.9
10	30°43.7	352°55.0	13°19.2	295°33.9	24°29.5	129°42.5	-22°33.9	99°03.6	-21°33.9
11	45°46.2	7°54.6	13°20.2	310°34.6	24°29.5	144°45.3	-22°33.9	114°06.1	-21°33.9
12	60°48.7	22°54.1	13°21.3	325°35.3	24°29.4	159°48.1	-22°33.8	129°08.7	-21°33.9
13	75°51.1	37°53.6	13°22.3	340°36.0	24°29.4	174°50.8	-22°33.8	144°11.2	-21°33.9
14	90°53.6	52°53.1	13°23.3	355°36.7	24°29.3	189°53.6	-22°33.8	159°13.8	-21°33.9
15	105°56.0	67°52.6	13°24.3	10°37.4	24°29.3	204°56.4	-22°33.8	174°16.4	-21°33.9
16	120°58.5	82°52.1	13°25.3	25°38.0	24°29.2	219°59.1	-22°33.8	189°18.9	-21°34.0
17	136°01.0	97°51.6	13°26.3	40°38.7	24°29.1	235°01.9	-22°33.8	204°21.5	-21°34.0
18	151°03.4	112°51.2	13°27.3	55°39.4	24°29.1	250°04.7	-22°33.8	219°24.0	-21°34.0
19	166°05.9	127°50.7	13°28.2	70°40.1	24°29.0	265°07.4	-22°33.7	234°26.6	-21°34.0
20	181°08.4	142°50.2	13°29.2	85°40.8	24°29.0	280°10.2	-22°33.7	249°29.2	-21°34.0
21	196°10.8	157°49.7	13°30.2	100°41.5	24°28.9	295°13.0	-22°33.7	264°31.7	-21°34.0
22	211°13.3	172°49.2	13°31.2	115°42.2	24°28.9	310°15.7	-22°33.7	279°34.3	-21°34.1
23	226°15.8	187°48.7	13°32.2	130°42.9	24°28.8	325°18.5	-22°33.7	294°36.9	-21°34.1
Mer.pass.:7:57:		v-0.5 d1.0 m-3.8		v0.7 d-0.0 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	241°18.2	202°48.2	13°33.2	145°43.6	24°28.8	340°21.3	-22°33.7	309°39.4	-21°34.1
1	256°20.7	217°47.7	13°34.2	160°44.3	24°28.7	355°24.1	-22°33.7	324°42.0	-21°34.1
2	271°23.2	232°47.3	13°35.2	175°45.0	24°28.6	10°26.8	-22°33.6	339°44.5	-21°34.1
3	286°25.6	247°46.8	13°36.2	190°45.7	24°28.6	25°29.6	-22°33.6	354°47.1	-21°34.1
4	301°28.1	262°46.3	13°37.2	205°46.4	24°28.5	40°32.4	-22°33.6	9°49.7	-21°34.2
5	316°30.5	277°45.8	13°38.2	220°47.1	24°28.5	55°35.1	-22°33.6	24°52.2	-21°34.2
6	331°33.0	292°45.3	13°39.2	235°47.8	24°28.4	70°37.9	-22°33.6	39°54.8	-21°34.2
7	346°35.5	307°44.8	13°40.2	250°48.5	24°28.3	85°40.7	-22°33.6	54°57.4	-21°34.2
8	1°37.9	322°44.3	13°41.2	265°49.2	24°28.3	100°43.5	-22°33.5	69°59.9	-21°34.2
9	16°40.4	337°43.8	13°42.2	280°49.9	24°28.2	115°46.2	-22°33.5	85°02.5	-21°34.2
10	31°42.9	352°43.3	13°43.2	295°50.6	24°28.2	130°49.0	-22°33.5	100°05.0	-21°34.2
11	46°45.3	7°42.8	13°44.1	310°51.3	24°28.1	145°51.8	-22°33.5	115°07.6	-21°34.3
12	61°47.8	22°42.3	13°45.1	325°52.0	24°28.0	160°54.6	-22°33.5	130°10.2	-21°34.3
13	76°50.3	37°41.8	13°46.1	340°52.7	24°28.0	175°57.3	-22°33.5	145°12.7	-21°34.3
14	91°52.7	52°41.3	13°47.1	355°53.4	24°27.9	191°00.1	-22°33.5	160°15.3	-21°34.3
15	106°55.2	67°40.8	13°48.1	10°54.1	24°27.9	206°02.9	-22°33.4	175°17.9	-21°34.3
16	121°57.7	82°40.3	13°49.1	25°54.8	24°27.8	221°05.6	-22°33.4	190°20.4	-21°34.3
17	137°00.1	97°39.8	13°50.1	40°55.5	24°27.7	236°08.4	-22°33.4	205°23.0	-21°34.4
18	152°02.6	112°39.3	13°51.1	55°56.2	24°27.7	251°11.2	-22°33.4	220°25.6	-21°34.4
19	167°05.0	127°38.9	13°52.0	70°56.9	24°27.6	266°14.0	-22°33.4	235°28.1	-21°34.4
20	182°07.5	142°38.4	13°53.0	85°57.6	24°27.5	281°16.7	-22°33.4	250°30.7	-21°34.4
21	197°10.0	157°37.9	13°54.0	100°58.3	24°27.5	296°19.5	-22°33.4	265°33.3	-21°34.4
22	212°12.4	172°37.4	13°55.0	115°59.0	24°27.4	311°22.3	-22°33.3	280°35.8	-21°34.4
23	227°14.9	187°36.9	13°56.0	130°59.7	24°27.4	326°25.1	-22°33.3	295°38.4	-21°34.5
Mer.pass.:7:53:		v-0.5 d1.0 m-3.8		v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Stars	SHA	Dec
Alpheratz	357°39.5	29°11.6
Ankaa	353°12.0	-42°12.0
Schedar	349°36.3	56°38.2
Diphda	348°52.0	-17°52.9
Achernar	335°24.3	-57°08.3
Hamal	327°56.5	23°33.0
Polaris	316°28.0	89°20.5
Akamar	315°15.7	-40°13.8
Menkar	314°11.2	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.8	-52°42.7
Sirius	258°30.4	-16°44.6
Adara	255°09.6	-29°00.2
Procyon	244°55.6	5°10.5
Pollux	243°22.9	27°58.7
Avior	234°16.7	-59°34.6
Suhail	222°49.6	-43°30.9
Miaplacidus	221°39.1	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.6	61°39.1
Denebola	182°29.3	14°27.9
Gienah	175°47.9	-17°39.0
Acrux	173°04.4	-63°12.5
Gacrux	171°56.0	-57°13.4
Alioth	166°16.8	55°51.6
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.3
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.9
Zubenelg.	137°00.6	-16°07.2
Kochab	137°19.0	74°04.8
Alphecca	126°07.2	26°39.1
Antares	112°20.9	-26°28.4
Atria	107°18.6	-69°03.5
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°06.9
Rasalhague	96°02.4	12°32.8
Etamin	90°43.8	51°29.1
Kaus Aust.	83°38.1	-34°22.3
Vega	80°35.9	38°48.0
Nunki	75°53.1	-26°16.2
Altair	62°04.2	8°55.1
Peacock	53°12.6	-56°40.1
Deneb	49°28.6	45°20.7
Enif	33°43.1	9°57.7
Alnair	27°38.7	-46°51.8
Fomalhaut	15°19.7	-29°31.1
Scheat	13°49.6	28°11.0
Markab	13°34.4	15°18.3

2019/5/2	SHA	Mer.pass
Venus	323°51.3	10:28
Mars	265°50.3	14:19
Jupiter	98°48.6	01:27
Saturn	68°16.7	03:29

2019/5/2	SHA	Mer.pass
Venus	322°40.8	10:28
Mars	265°07.8	14:18
Jupiter	98°55.8	01:23
Saturn	68°18.9	03:25

2019/5/2	SHA	Mer.pass
Venus	321°30.0	10:29
Mars	264°25.4	14:16
Jupiter	99°03.1	01:18
Saturn	68°21.2	03:21

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°50.7	20°16.9	320°08.8	9.3	-22°16.3	-0.8	55.9
1	195°50.6	20°17.4	334°37.1	9.4	-22°17.0	-0.7	55.8
2	210°50.6	20°17.9	349°05.5	9.4	-22°17.6	-0.5	55.8
3	225°50.5	20°18.4	3°33.9	9.4	-22°18.1	-0.4	55.8
4	240°50.5	20°18.9	18°02.4	9.5	-22°18.5	-0.3	55.8
5	255°50.4	20°19.4	32°30.8	9.5	-22°18.7	-0.2	55.7
6	270°50.4	20°19.9	46°59.3	9.5	-22°18.9	-0.1	55.7
7	285°50.4	20°20.4	61°27.9	9.6	-22°18.9	0.0	55.7
8	300°50.3	20°20.9	75°56.5	9.6	-22°18.8	0.2	55.7
9	315°50.3	20°21.4	90°25.1	9.6	-22°18.6	0.3	55.6
10	330°50.2	20°21.9	104°53.7	9.7	-22°18.2	0.4	55.6
11	345°50.2	20°22.4	119°22.4	9.7	-22°17.8	0.5	55.6
12	0°50.1	20°22.9	133°51.1	9.7	-22°17.2	0.6	55.6
13	15°50.1	20°23.4	148°19.9	9.8	-22°16.5	0.7	55.5
14	30°50.0	20°23.9	162°48.6	9.8	-22°15.7	0.9	55.5
15	45°50.0	20°24.4	177°17.5	9.8	-22°14.8	1.0	55.5
16	60°49.9	20°24.8	191°46.3	9.9	-22°13.8	1.1	55.5
17	75°49.9	20°25.3	206°15.3	9.9	-22°12.7	1.2	55.4
18	90°49.9	20°25.8	220°44.2	10.0	-22°11.4	1.3	55.4
19	105°49.8	20°26.3	235°13.2	10.0	-22°10.0	1.4	55.4
20	120°49.8	20°26.8	249°42.2	10.1	-22°08.6	1.5	55.4
21	135°49.7	20°27.3	264°11.3	10.1	-22°07.0	1.6	55.3
22	150°49.7	20°27.8	278°40.4	10.1	-22°05.3	1.8	55.3
23	165°49.6	20°28.3	293°09.6	10.2	-22°03.5	1.9	55.3
	SD.=15.8	d=0.5			S.D.=15.2		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°49.6	20°28.7	307°38.8	10.2	-22°01.5	2.0	55.3
1	195°49.5	20°29.2	322°08.0	10.3	-21°59.5	2.1	55.3
2	210°49.5	20°29.7	336°37.3	10.3	-21°57.4	2.2	55.2
3	225°49.4	20°30.2	351°06.7	10.4	-21°55.1	2.3	55.2
4	240°49.4	20°30.7	5°36.1	10.4	-21°52.8	2.4	55.2
5	255°49.3	20°31.2	20°05.5	10.5	-21°50.3	2.5	55.2
6	270°49.3	20°31.6	34°35.0	10.5	-21°47.7	2.6	55.1
7	285°49.2	20°32.1	49°04.5	10.6	-21°45.0	2.7	55.1
8	300°49.2	20°32.6	63°34.1	10.6	-21°42.3	2.8	55.1
9	315°49.1	20°33.1	78°03.7	10.7	-21°39.4	2.9	55.1
10	330°49.1	20°33.6	92°33.4	10.7	-21°36.4	3.0	55.1
11	345°49.0	20°34.0	107°03.2	10.8	-21°33.3	3.1	55.0
12	0°49.0	20°34.5	121°32.9	10.8	-21°30.1	3.3	55.0
13	15°48.9	20°35.0	136°02.8	10.9	-21°26.8	3.4	55.0
14	30°48.9	20°35.5	150°32.6	10.9	-21°23.4	3.5	55.0
15	45°48.8	20°36.0	165°02.6	11.0	-21°19.9	3.6	55.0
16	60°48.8	20°36.4	179°32.6	11.0	-21°16.3	3.7	54.9
17	75°48.7	20°36.9	194°02.6	11.1	-21°12.5	3.8	54.9
18	90°48.7	20°37.4	208°32.7	11.1	-21°08.7	3.9	54.9
19	105°48.6	20°37.9	223°02.8	11.2	-21°04.8	4.0	54.9
20	120°48.5	20°38.3	237°33.0	11.2	-21°00.8	4.1	54.9
21	135°48.5	20°38.8	252°03.3	11.3	-20°56.7	4.2	54.9
22	150°48.4	20°39.3	266°33.6	11.3	-20°52.5	4.3	54.8
23	165°48.4	20°39.7	281°03.9	11.4	-20°48.2	4.3	54.8
	SD.=15.8	d=0.5			S.D.=15.1		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°48.3	20°40.2	295°34.3	11.4	-20°43.8	4.4	54.8
1	195°48.3	20°40.7	310°04.8	11.5	-20°39.3	4.5	54.8
2	210°48.2	20°41.2	324°35.3	11.5	-20°34.7	4.6	54.8
3	225°48.2	20°41.6	339°05.9	11.6	-20°30.0	4.7	54.8
4	240°48.1	20°42.1	353°36.5	11.6	-20°25.3	4.8	54.7
5	255°48.1	20°42.6	8°07.2	11.7	-20°20.4	4.9	54.7
6	270°48.0	20°43.0	22°37.9	11.8	-20°15.4	5.0	54.7
7	285°47.9	20°43.5	37°08.7	11.8	-20°10.4	5.1	54.7
8	300°47.9	20°44.0	51°39.5	11.9	-20°05.2	5.2	54.7
9	315°47.8	20°44.4	66°10.4	11.9	-20°00.0	5.3	54.7
10	330°47.8	20°44.9	80°41.4	12.0	-19°54.7	5.4	54.6
11	345°47.7	20°45.4	95°12.4	12.0	-19°49.3	5.5	54.6
12	0°47.7	20°45.8	109°43.4	12.1	-19°43.8	5.5	54.6
13	15°47.6	20°46.3	124°14.5	12.1	-19°38.2	5.6	54.6
14	30°47.6	20°46.7	138°45.7	12.2	-19°32.5	5.7	54.6
15	45°47.5	20°47.2	153°16.9	12.2	-19°26.7	5.8	54.6
16	60°47.4	20°47.7	167°48.2	12.3	-19°20.9	5.9	54.6
17	75°47.4	20°48.1	182°19.5	12.4	-19°15.0	6.0	54.5
18	90°47.3	20°48.6	196°50.9	12.4	-19°08.9	6.1	54.5
19	105°47.3	20°49.0	211°22.4	12.5	-19°02.8	6.1	54.5
20	120°47.2	20°49.5	225°53.8	12.5	-18°56.7	6.2	54.5
21	135°47.1	20°50.0	240°25.4	12.6	-18°50.4	6.3	54.5
22	150°47.1	20°50.4	254°57.0	12.6	-18°44.1	6.4	54.5
23	165°47.0	20°50.9	269°28.6	12.7	-18°37.6	6.5	54.5
	SD.=15.8	d=0.5			S.D.=15.0		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	00:57	23:05	–:–	–:–
66	–:–	–:–	01:51	22:06	–:–	–:–
64	–:–	–:–	02:24	21:32	–:–	–:–
62	–:–	01:16	02:47	21:08	22:42	–:–
60	–:–	01:55	03:06	20:49	22:02	–:–
58	–:–	02:21	03:21	20:34	21:35	–:–
56	01:09	02:41	03:34	20:20	21:14	22:49
54	01:44	02:58	03:46	20:09	20:57	22:12
52	02:09	03:12	03:56	19:59	20:43	21:47
50	02:28	03:24	04:05	19:50	20:31	21:27
45	03:03	03:48	04:23	19:31	20:06	20:52
40	03:28	04:07	04:39	19:15	19:47	20:26
35	03:48	04:23	04:51	19:02	19:31	20:06
30	04:04	04:36	05:03	18:51	19:18	19:50
20	04:29	04:58	05:22	18:32	18:56	19:24
10	04:49	05:15	05:38	18:16	18:38	19:05
0	05:05	05:31	05:53	18:00	18:22	18:48
-10	05:20	05:46	06:08	17:45	18:08	18:33
-20	05:34	06:01	06:24	17:29	17:53	18:20
-30	05:48	06:17	06:42	17:11	17:36	18:06
-35	05:55	06:26	06:53	17:00	17:28	17:59
-40	06:02	06:36	07:05	16:48	17:18	17:51
-45	06:11	06:47	07:19	16:34	17:06	17:42
-50	06:20	07:00	07:37	16:16	16:53	17:33
-52	06:24	07:06	07:45	16:08	16:47	17:29
-54	06:28	07:13	07:54	15:59	16:40	17:25
-56	06:33	07:20	08:04	15:49	16:33	17:20
-58	06:38	07:28	08:16	15:37	16:25	17:15
-60	06:44	07:38	08:30	15:23	16:15	17:09

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	03:33	02:57	–:–	03:45	06:03
66	01:13	01:55	02:14	04:17	05:22	06:46
64	00:31	01:17	01:44	04:59	05:60	07:15
62	00:03	00:50	01:22	05:27	06:26	07:37
60	–:–	00:29	01:04	05:49	06:47	07:55
58	–:–	00:12	00:49	06:07	07:04	08:10
56	23:58	–:–	00:36	06:22	07:18	08:22
54	23:45	–:–	00:25	06:35	07:31	08:33
52	23:34	–:–	00:15	06:46	07:42	08:43
50	23:24	–:–	00:06	06:56	07:51	08:51
45	23:04	23:47	–:–	07:17	08:12	09:10
40	22:47	23:32	–:–	07:34	08:28	09:25
35	22:33	23:19	23:59	07:48	08:42	09:37
30	22:21	23:07	23:49	08:01	08:54	09:48
20	21:60	22:48	23:32	08:22	09:15	10:07
10	21:42	22:31	23:17	08:41	09:32	10:23
0	21:25	22:15	23:03	08:58	09:49	10:38
-10	21:08	21:59	22:48	09:15	10:06	10:53
-20	20:49	21:42	22:33	09:33	10:23	11:09
-30	20:28	21:22	22:16	09:54	10:43	11:28
-35	20:16	21:11	22:06	10:07	10:55	11:38
-40	20:02	20:57	21:54	10:21	11:09	11:50
-45	19:45	20:42	21:41	10:38	11:25	12:05
-50	19:25	20:22	21:24	10:59	11:45	12:22
-52	19:15	20:13	21:16	11:09	11:54	12:30
-54	19:04	20:03	21:07	11:20	12:04	12:39
-56	18:51	19:51	20:57	11:32	12:16	12:50
-58	18:37	19:38	20:46	11:47	12:30	13:01
-60	18:19	19:22	20:33	12:04	12:46	13:15

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	03:23	03:21	11:56	02:45	15:11	18(86%)
23	03:18	03:16	11:56	03:36	16:01	19(79%)
24	03:13	03:11	11:56	04:26	16:50	20(70%)

May 25, 26 ,27 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	242°17.4	202°36.4	13°57.0	146°00.4	24°27.3	341°27.8	-22°33.3	310°41.0	-21°34.5
1	257°19.8	217°35.9	13°57.9	161°01.1	24°27.2	356°30.6	-22°33.3	325°43.5	-21°34.5
2	272°22.3	232°35.4	13°58.9	176°01.8	24°27.2	11°33.4	-22°33.3	340°46.1	-21°34.5
3	287°24.8	247°34.9	13°59.9	191°02.5	24°27.1	26°36.2	-22°33.3	355°48.7	-21°34.5
4	302°27.2	262°34.4	14°00.9	206°03.2	24°27.0	41°38.9	-22°33.3	10°51.2	-21°34.5
5	317°29.7	277°33.9	14°01.9	221°03.9	24°27.0	56°41.7	-22°33.2	25°53.8	-21°34.6
6	332°32.1	292°33.3	14°02.8	236°04.6	24°26.9	71°44.5	-22°33.2	40°56.4	-21°34.6
7	347°34.6	307°32.8	14°03.8	251°05.3	24°26.8	86°47.3	-22°33.2	55°58.9	-21°34.6
8	2°37.1	322°32.3	14°04.8	266°06.0	24°26.8	101°50.0	-22°33.2	71°01.5	-21°34.6
9	17°39.5	337°31.8	14°05.8	281°06.7	24°26.7	116°52.8	-22°33.2	86°04.1	-21°34.6
10	32°42.0	352°31.3	14°06.7	296°07.4	24°26.6	131°55.6	-22°33.2	101°06.6	-21°34.6
11	47°44.5	7°30.8	14°07.7	311°08.1	24°26.6	146°58.4	-22°33.1	116°09.2	-21°34.7
12	62°46.9	22°30.3	14°08.7	326°08.7	24°26.5	162°01.1	-22°33.1	131°11.8	-21°34.7
13	77°49.4	37°29.8	14°09.7	341°09.4	24°26.4	177°03.9	-22°33.1	146°14.3	-21°34.7
14	92°51.9	52°29.3	14°10.6	356°10.1	24°26.4	192°06.7	-22°33.1	161°16.9	-21°34.7
15	107°54.3	67°28.8	14°11.6	11°10.8	24°26.3	207°09.5	-22°33.1	176°19.5	-21°34.7
16	122°56.8	82°28.3	14°12.6	26°11.5	24°26.2	222°12.3	-22°33.1	191°22.0	-21°34.7
17	137°59.3	97°27.8	14°13.6	41°12.2	24°26.1	237°15.0	-22°33.1	206°24.6	-21°34.8
18	153°01.7	112°27.3	14°14.5	56°12.9	24°26.1	252°17.8	-22°33.0	221°27.2	-21°34.8
19	168°04.2	127°26.8	14°15.5	71°13.6	24°26.0	267°20.6	-22°33.0	236°29.7	-21°34.8
20	183°06.6	142°26.3	14°16.5	86°14.3	24°25.9	282°23.4	-22°33.0	251°32.3	-21°34.8
21	198°09.1	157°25.8	14°17.5	101°15.0	24°25.9	297°26.1	-22°33.0	266°34.9	-21°34.8
22	213°11.6	172°25.3	14°18.4	116°15.7	24°25.8	312°28.9	-22°33.0	281°37.4	-21°34.8
23	228°14.0	187°24.7	14°19.4	131°16.4	24°25.7	327°31.7	-22°33.0	296°40.0	-21°34.9
Mer.pass.:7:49:	v-0.5 d1.0 m-3.8			v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	243°16.5	202°24.2	14°20.4	146°17.1	24°25.6	342°34.5	-22°33.0	311°42.6	-21°34.9
1	258°19.0	217°23.7	14°21.3	161°17.8	24°25.6	357°37.3	-22°32.9	326°45.2	-21°34.9
2	273°21.4	232°23.2	14°22.3	176°18.5	24°25.5	12°40.0	-22°32.9	341°47.7	-21°34.9
3	288°23.9	247°22.7	14°23.3	191°19.2	24°25.4	27°42.8	-22°32.9	356°50.3	-21°34.9
4	303°26.4	262°22.2	14°24.2	206°19.9	24°25.3	42°45.6	-22°32.9	11°52.9	-21°34.9
5	318°28.8	277°21.7	14°25.2	221°20.6	24°25.3	57°48.4	-22°32.9	26°55.4	-21°35.0
6	333°31.3	292°21.2	14°26.2	236°21.3	24°25.2	72°51.2	-22°32.9	41°58.0	-21°35.0
7	348°33.8	307°20.6	14°27.1	251°22.0	24°25.1	87°53.9	-22°32.8	57°00.6	-21°35.0
8	3°36.2	322°20.1	14°28.1	266°22.7	24°25.0	102°56.7	-22°32.8	72°03.1	-21°35.0
9	18°38.7	337°19.6	14°29.1	281°23.4	24°25.0	117°59.5	-22°32.8	87°05.7	-21°35.0
10	33°41.1	352°19.1	14°30.0	296°24.1	24°24.9	133°02.3	-22°32.8	102°08.3	-21°35.0
11	48°43.6	7°18.6	14°31.0	311°24.8	24°24.8	148°05.1	-22°32.8	117°10.9	-21°35.1
12	63°46.1	22°18.1	14°31.9	326°25.5	24°24.7	163°07.8	-22°32.8	132°13.4	-21°35.1
13	78°48.5	37°17.6	14°32.9	341°26.2	24°24.7	178°10.6	-22°32.8	147°16.0	-21°35.1
14	93°51.0	52°17.0	14°33.9	356°26.9	24°24.6	193°13.4	-22°32.7	162°18.6	-21°35.1
15	108°53.5	67°16.5	14°34.8	11°27.6	24°24.5	208°16.2	-22°32.7	177°21.1	-21°35.1
16	123°55.9	82°16.0	14°35.8	26°28.3	24°24.4	223°19.0	-22°32.7	192°23.7	-21°35.1
17	138°58.4	97°15.5	14°36.7	41°29.0	24°24.4	238°21.7	-22°32.7	207°26.3	-21°35.2
18	154°00.9	112°15.0	14°37.7	56°29.7	24°24.3	253°24.5	-22°32.7	222°28.9	-21°35.2
19	169°03.3	127°14.5	14°38.7	71°30.4	24°24.2	268°27.3	-22°32.7	237°31.4	-21°35.2
20	184°05.8	142°13.9	14°39.6	86°31.2	24°24.1	283°30.1	-22°32.6	252°34.0	-21°35.2
21	199°08.2	157°13.4	14°40.6	101°31.9	24°24.0	298°32.9	-22°32.6	267°36.6	-21°35.2
22	214°10.7	172°12.9	14°41.5	116°32.6	24°24.0	313°35.6	-22°32.6	282°39.2	-21°35.2
23	229°13.2	187°12.4	14°42.5	131°33.3	24°23.9	328°38.4	-22°32.6	297°41.7	-21°35.3
Mer.pass.:7:45:	v-0.5 d1.0 m-3.8			v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	244°15.6	202°11.9	14°43.4	146°34.0	24°23.8	343°41.2	-22°32.6	312°44.3	-21°35.3
1	259°18.1	217°11.3	14°44.4	161°34.7	24°23.7	358°44.0	-22°32.6	327°46.9	-21°35.3
2	274°20.6	232°10.8	14°45.3	176°35.4	24°23.6	13°46.8	-22°32.6	342°49.4	-21°35.3
3	289°23.0	247°10.3	14°46.3	191°36.1	24°23.6	28°49.6	-22°32.5	357°52.0	-21°35.3
4	304°25.5	262°09.8	14°47.2	206°36.8	24°23.5	43°52.3	-22°32.5	12°54.6	-21°35.4
5	319°28.0	277°09.2	14°48.2	221°37.5	24°23.4	58°55.1	-22°32.5	27°57.2	-21°35.4
6	334°30.4	292°08.7	14°49.1	236°38.2	24°23.3	73°57.9	-22°32.5	42°59.7	-21°35.4
7	349°32.9	307°08.2	14°50.1	251°38.9	24°23.2	89°00.7	-22°32.5	58°02.3	-21°35.4
8	4°35.4	322°07.7	14°51.0	266°39.6	24°23.1	104°03.5	-22°32.5	73°04.9	-21°35.4
9	19°37.8	337°07.1	14°52.0	281°40.3	24°23.1	119°06.3	-22°32.4	88°07.5	-21°35.4
10	34°40.3	352°06.6	14°52.9	296°41.0	24°23.0	134°09.0	-22°32.4	103°10.0	-21°35.5
11	49°42.7	7°06.1	14°53.9	311°41.7	24°22.9	149°11.8	-22°32.4	118°12.6	-21°35.5
12	64°45.2	22°05.6	14°54.8	326°42.4	24°22.8	164°14.6	-22°32.4	133°15.2	-21°35.5
13	79°47.7	37°05.0	14°55.8	341°43.1	24°22.7	179°17.4	-22°32.4	148°17.8	-21°35.5
14	94°50.1	52°04.5	14°56.7	356°43.8	24°22.6	194°20.2	-22°32.4	163°20.3	-21°35.5
15	109°52.6	67°04.0	14°57.7	11°44.5	24°22.5	209°23.0	-22°32.3	178°22.9	-21°35.5
16	124°55.1	82°03.5	14°58.6	26°45.2	24°22.5	224°25.7	-22°32.3	193°25.5	-21°35.6
17	139°57.5	97°02.9	14°59.6	41°45.9	24°22.4	239°28.5	-22°32.3	208°28.1	-21°35.6
18	154°60.0	112°02.4	15°00.5	56°46.6	24°22.3	254°31.3	-22°32.3	223°30.6	-21°35.6
19	170°02.5	127°01.9	15°01.4	71°47.3	24°22.2	269°34.1	-22°32.3	238°33.2	-21°35.6
20	185°04.9	142°01.3	15°02.4	86°48.0	24°22.1	284°36.9	-22°32.3	253°35.8	-21°35.6
21	200°07.4	157°00.8	15°03.3	101°48.7	24°22.0	299°39.7	-22°32.3	268°38.4	-21°35.7
22	215°09.9	172°00.3	15°04.3	116°49.4	24°21.9	314°42.5	-22°32.2	283°40.9	-21°35.7
23	230°12.3	186°59.7	15°05.2	131°50.1	24°21.9	329°45.2	-22°32.2	298°43.5	-21°35.7
Mer.pass.:7:41:	v-0.5 d1.0 m-3.8			v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Stars

Star	SHA	Dec
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.9	-42°12.0
Schedar	349°36.3	56°38.2
Diphda	348°51.9	-17°52.9
Achernar	335°24.2	-57°08.3
Hamal	327°56.5	23°33.0
Polaris	316°27.4	89°20.5
Akamar	315°15.7	-40°13.8
Menkar	314°11.1	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°01.0
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.8	-52°42.6
Sirius	258°30.4	-16°44.6
Adara	255°09.6	-29°00.2
Procyon	244°55.7	5°10.5
Pollux	243°22.9	27°58.7
Avior	234°16.7	-59°34.6
Suhail	222°49.6	-43°30.9
Miaplacidus	221°39.2	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.6	61°39.1
Denebola	182°29.3	14°28.0
Gienah	175°47.9	-17°39.0
Acrux	173°04.4	-63°12.5
Gacrux	171°56.1	-57°13.4
Alioth	166°16.8	55°51.6
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.3
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.9
Zubenelg.	137°00.6	-16°07.3
Kochab	137°19.0	74°04.8
Alphecca	126°07.2	26°39.1
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.5
Sabik	102°07.6	-15°44.8
Shaula	96°16.0	-37°06.9
Rasalhague	96°02.4	12°32.9
Etamin	90°43.8	51°29.1
Kaus Aust.	83°38.1	-34°22.3
Vega	80°35.9	38°48.0
Nunki	75°53.0	-26°16.2
Altair	62°04.2	8°55.1
Peacock	53°12.6	-56°40.1
Deneb	49°28.5	45°20.7
Enif	33°43.1	9°57.7
Alnair	27°38.7	-46°51.8
Fomalhaut	15°19.7	-29°31.1
Scheat	13°49.6	28°11.0
Markab	13°34.4	15°18.4

2019/5/2	SHA	Mer.pass
Venus	320°19.0	10:30
Mars	263°43.0	14:15
Jupiter	99°10.5	01:14
Saturn	68°23.6	03:17

2019/5/2	SHA	Mer.pass
Venus	319°07.7	10:31
Mars	263°00.6	14:14
Jupiter	99°18.0	01:09
Saturn	68°26.1	03:13

2019/5/2	SHA	Mer.pass
Venus	317°56.2	10:32
Mars	262°18.3	14:13
Jupiter	99°25.6	01:05
Saturn	68°28.7	03:09

Horizontal paralax	
Venus:	0.1
Mars:	0.1

2019 May 25 to May. 27

h	Sun GHA	Sun Dec	Moon GHA	ν	Dec	d	HP
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°47.0	20°51.3	284°00.4	12.7	-18°31.1	6.5	54.5
1	195°46.9	20°51.8	298°32.1	12.8	-18°24.5	6.6	54.5
2	210°46.9	20°52.2	313°03.9	12.8	-18°17.9	6.7	54.4
3	225°46.8	20°52.7	327°35.8	12.9	-18°11.1	6.8	54.4
4	240°46.7	20°53.1	342°07.7	12.9	-18°04.3	6.9	54.4
5	255°46.7	20°53.6	356°39.7	13.0	-17°57.4	6.9	54.4
6	270°46.6	20°54.0	11°11.7	13.0	-17°50.4	7.0	54.4
7	285°46.5	20°54.5	25°43.8	13.1	-17°43.4	7.1	54.4
8	300°46.5	20°55.0	40°15.9	13.2	-17°36.2	7.2	54.4
9	315°46.4	20°55.4	54°48.1	13.2	-17°29.0	7.2	54.4
10	330°46.4	20°55.9	69°20.3	13.3	-17°21.8	7.3	54.4
11	345°46.3	20°56.3	83°52.6	13.3	-17°14.4	7.4	54.4
12	0°46.2	20°56.7	98°24.9	13.4	-17°07.0	7.5	54.4
13	15°46.2	20°57.2	112°57.3	13.4	-16°59.5	7.5	54.3
14	30°46.1	20°57.6	127°29.7	13.5	-16°51.9	7.6	54.3
15	45°46.1	20°58.1	142°02.2	13.5	-16°44.3	7.7	54.3
16	60°46.0	20°58.5	156°34.7	13.5	-16°36.6	7.7	54.3
17	75°45.9	20°59.0	171°07.3	13.6	-16°28.8	7.8	54.3
18	90°45.9	20°59.4	185°39.9	13.6	-16°21.0	7.9	54.3
19	105°45.8	20°59.9	200°12.6	13.7	-16°13.1	7.9	54.3
20	120°45.7	21°00.3	214°45.3	13.7	-16°05.1	8.0	54.3
21	135°45.7	21°00.8	229°18.0	13.8	-15°57.1	8.1	54.3
22	150°45.6	21°01.2	243°50.8	13.8	-15°48.9	8.1	54.3
23	165°45.5	21°01.6	258°23.7	13.9	-15°40.8	8.2	54.3
	SD.=15.8	d=0.5			S.D.=14.9		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°45.5	21°02.1	272°56.6	13.9	-15°32.5	8.3	54.3
1	195°45.4	21°02.5	287°29.5	14.0	-15°24.2	8.3	54.3
2	210°45.3	21°03.0	302°02.5	14.0	-15°15.9	8.4	54.3
3	225°45.3	21°03.4	316°35.6	14.1	-15°07.4	8.5	54.3
4	240°45.2	21°03.8	331°08.6	14.1	-14°58.9	8.5	54.3
5	255°45.2	21°04.3	345°41.7	14.1	-14°50.4	8.6	54.3
6	270°45.1	21°04.7	0°14.9	14.2	-14°41.8	8.6	54.3
7	285°45.0	21°05.2	14°48.1	14.2	-14°33.1	8.7	54.3
8	300°45.0	21°05.6	29°21.3	14.3	-14°24.4	8.8	54.3
9	315°44.9	21°06.0	43°54.6	14.3	-14°15.6	8.8	54.3
10	330°44.8	21°06.5	58°27.9	14.3	-14°06.7	8.9	54.3
11	345°44.8	21°06.9	73°01.3	14.4	-13°57.8	8.9	54.3
12	0°44.7	21°07.3	87°34.7	14.4	-13°48.8	9.0	54.3
13	15°44.6	21°07.8	102°08.1	14.5	-13°39.8	9.1	54.3
14	30°44.5	21°08.2	116°41.6	14.5	-13°30.7	9.1	54.3
15	45°44.5	21°08.6	131°15.1	14.5	-13°21.6	9.2	54.3
16	60°44.4	21°09.1	145°48.7	14.6	-13°12.4	9.2	54.3
17	75°44.3	21°09.5	160°22.2	14.6	-13°03.2	9.3	54.3
18	90°44.3	21°09.9	174°55.9	14.6	-12°53.9	9.3	54.3
19	105°44.2	21°10.3	189°29.5	14.7	-12°44.5	9.4	54.3
20	120°44.1	21°10.8	204°03.2	14.7	-12°35.1	9.4	54.3
21	135°44.1	21°11.2	218°36.9	14.7	-12°25.6	9.5	54.3
22	150°44.0	21°11.6	233°10.7	14.8	-12°16.1	9.5	54.3
23	165°43.9	21°12.1	247°44.4	14.8	-12°06.6	9.6	54.3
	SD.=15.8	d=0.4			S.D.=14.8		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°43.9	21°12.5	262°18.2	14.8	-11°57.0	9.6	54.3
1	195°43.8	21°12.9	276°52.1	14.9	-11°47.3	9.7	54.3
2	210°43.7	21°13.3	291°26.0	14.9	-11°37.6	9.7	54.3
3	225°43.6	21°13.8	305°59.9	14.9	-11°27.9	9.8	54.3
4	240°43.6	21°14.2	320°33.8	14.9	-11°18.0	9.8	54.3
5	255°43.5	21°14.6	335°07.7	15.0	-11°08.2	9.9	54.3
6	270°43.4	21°15.0	349°41.7	15.0	-10°58.3	9.9	54.3
7	285°43.4	21°15.4	4°15.7	15.0	-10°48.4	10.0	54.3
8	300°43.3	21°15.9	18°49.8	15.0	-10°38.4	10.0	54.3
9	315°43.2	21°16.3	33°23.8	15.1	-10°28.3	10.1	54.3
10	330°43.1	21°16.7	47°57.9	15.1	-10°18.3	10.1	54.3
11	345°43.1	21°17.1	62°32.0	15.1	-10°08.1	10.1	54.3
12	0°43.0	21°17.5	77°06.2	15.1	-9°58.0	10.2	54.3
13	15°42.9	21°18.0	91°40.3	15.2	-9°47.8	10.2	54.3
14	30°42.9	21°18.4	106°14.5	15.2	-9°37.5	10.3	54.3
15	45°42.8	21°18.8	120°48.7	15.2	-9°27.2	10.3	54.4
16	60°42.7	21°19.2	135°22.9	15.2	-9°16.9	10.4	54.4
17	75°42.6	21°19.6	149°57.1	15.2	-9°06.5	10.4	54.4
18	90°42.6	21°20.0	164°31.4	15.3	-8°56.1	10.4	54.4
19	105°42.5	21°20.4	179°05.6	15.3	-8°45.7	10.5	54.4
20	120°42.4	21°20.9	193°39.9	15.3	-8°35.2	10.5	54.4
21	135°42.3	21°21.3	208°14.2	15.3	-8°24.6	10.5	54.4
22	150°42.3	21°21.7	222°48.5	15.3	-8°14.1	10.6	54.4
23	165°42.2	21°22.1	237°22.9	15.3	-8°03.5	10.6	54.4
	SD.=15.8	d=0.4			S.D.=14.8		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	00:24	–:–	–:–	–:–
66	–:–	–:–	01:39	22:19	–:–	–:–
64	–:–	–:–	02:15	21:42	–:–	–:–
62	–:–	01:00	02:40	21:16	22:59	–:–
60	–:–	01:45	02:60	20:56	22:12	–:–
58	–:–	02:14	03:16	20:39	21:42	–:–
56	00:55	02:35	03:30	20:25	21:20	23:05
54	01:36	02:53	03:42	20:13	21:03	22:21
52	02:02	03:07	03:52	20:03	20:48	21:54
50	02:22	03:20	04:01	19:53	20:35	21:33
45	02:59	03:45	04:21	19:34	20:09	20:56
40	03:25	04:05	04:37	19:18	19:50	20:29
35	03:46	04:21	04:50	19:05	19:33	20:09
30	04:02	04:35	05:01	18:53	19:20	19:52
20	04:28	04:57	05:21	18:33	18:57	19:26
10	04:49	05:15	05:38	18:16	18:39	19:06
0	05:06	05:31	05:53	18:01	18:23	18:49
-10	05:21	05:47	06:09	17:45	18:07	18:33
-20	05:35	06:02	06:25	17:28	17:52	18:19
-30	05:49	06:18	06:44	17:10	17:35	18:05
-35	05:57	06:28	06:55	16:59	17:26	17:57
-40	06:04	06:38	07:08	16:46	17:16	17:49
-45	06:13	06:50	07:22	16:31	17:04	17:41
-50	06:23	07:03	07:40	16:13	16:50	17:31
-52	06:27	07:10	07:49	16:05	16:44	17:26
-54	06:32	07:17	07:58	15:55	16:37	17:22
-56	06:37	07:24	08:09	15:45	16:29	17:17
-58	06:42	07:33	08:21	15:32	16:21	17:11
-60	06:48	07:42	08:35	15:18	16:11	17:05

Lat.	Moonrise Sat	Moonrise Sun	Moonrise Mon	Moonset Sat	Moonset Sun	Moonset Mon
72	–:–	03:40	03:12	–:–	08:35	10:33
70	03:30	03:07	02:53	07:10	09:06	10:50
68	02:49	02:43	02:38	07:50	09:29	11:04
66	02:21	02:24	02:25	08:17	09:47	11:15
64	01:60	02:09	02:15	08:38	10:01	11:24
62	01:42	01:56	02:06	08:54	10:13	11:32
60	01:28	01:45	01:59	09:08	10:23	11:39
58	01:16	01:36	01:52	09:20	10:32	11:45
56	01:05	01:28	01:46	09:30	10:40	11:50
54	00:56	01:20	01:40	09:39	10:47	11:55
52	00:47	01:13	01:36	09:47	10:53	11:59
50	00:40	01:07	01:31	09:54	10:58	12:03
45	00:23	00:54	01:22	10:10	11:10	12:11
40	00:10	00:44	01:14	10:22	11:20	12:18
35	–:–	00:34	01:07	10:33	11:28	12:24
30	–:–	00:26	01:01	10:42	11:36	12:29
20	–:–	00:12	00:50	10:58	11:48	12:38
10	23:60	–:–	00:41	11:12	11:59	12:46
0	23:48	–:–	00:32	11:25	12:10	12:53
-10	23:37	–:–	00:23	11:38	12:20	12:60
-20	23:24	–:–	00:14	11:51	12:31	13:08
-30	23:10	–:–	00:03	12:07	12:43	13:16
-35	23:02	23:57	–:–	12:16	12:50	13:21
-40	22:52	23:50	–:–	12:26	12:58	13:27
-45	22:41	23:42	–:–	12:38	13:07	13:33
-50	22:27	23:32	–:–	12:53	13:19	13:41
-52	22:21	23:27	–:–	12:60	13:24	13:44
-54	22:14	23:22	–:–	13:07	13:29	13:48
-56	22:06	23:16	–:–	13:15	13:36	13:53
-58	21:57	23:10	–:–	13:25	13:43	13:57
-60	21:47	23:03	–:–	13:36	13:51	14:03

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
25	03:08	03:05	11:56	05:13	17:36	21(61%)
26	03:02	02:59	11:57	05:58	18:20	22(52%)
27	02:55	02:52	11:57	06:42	19:03	23(42%)

May 28, 29 ,30 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	245°14.8	201°59.2	15°06.1	146°50.8	24°21.8	344°48.0	-22°32.2	313°46.1	-21°35.7
1	260°17.2	216°58.7	15°07.1	161°51.5	24°21.7	359°50.8	-22°32.2	328°48.7	-21°35.7
2	275°19.7	231°58.2	15°08.0	176°52.2	24°21.6	14°53.6	-22°32.2	343°51.3	-21°35.7
3	290°22.2	246°57.6	15°09.0	191°52.9	24°21.5	29°56.4	-22°32.2	358°53.8	-21°35.8
4	305°24.6	261°57.1	15°09.9	206°53.6	24°21.4	44°59.2	-22°32.1	13°56.4	-21°35.8
5	320°27.1	276°56.6	15°10.8	221°54.3	24°21.3	60°02.0	-22°32.1	28°59.0	-21°35.8
6	335°29.6	291°56.0	15°11.8	236°55.0	24°21.2	75°04.7	-22°32.1	44°01.6	-21°35.8
7	350°32.0	306°55.5	15°12.7	251°55.7	24°21.1	90°07.5	-22°32.1	59°04.1	-21°35.8
8	5°34.5	321°54.9	15°13.6	266°56.4	24°21.0	105°10.3	-22°32.1	74°06.7	-21°35.8
9	20°37.0	336°54.4	15°14.6	281°57.1	24°21.0	120°13.1	-22°32.1	89°09.3	-21°35.9
10	35°39.4	351°53.9	15°15.5	296°57.8	24°20.9	135°15.9	-22°32.0	104°11.9	-21°35.9
11	50°41.9	6°53.3	15°16.4	311°58.5	24°20.8	150°18.7	-22°32.0	119°14.5	-21°35.9
12	65°44.3	21°52.8	15°17.4	326°59.2	24°20.7	165°21.5	-22°32.0	134°17.0	-21°35.9
13	80°46.8	36°52.3	15°18.3	341°59.9	24°20.6	180°24.3	-22°32.0	149°19.6	-21°35.9
14	95°49.3	51°51.7	15°19.2	357°00.7	24°20.5	195°27.0	-22°32.0	164°22.2	-21°36.0
15	110°51.7	66°51.2	15°20.2	12°01.4	24°20.4	210°29.8	-22°32.0	179°24.8	-21°36.0
16	125°54.2	81°50.6	15°21.1	27°02.1	24°20.3	225°32.6	-22°31.9	194°27.4	-21°36.0
17	140°56.7	96°50.1	15°22.0	42°02.8	24°20.2	240°35.4	-22°31.9	209°29.9	-21°36.0
18	155°59.1	111°49.6	15°23.0	57°03.5	24°20.1	255°38.2	-22°31.9	224°32.5	-21°36.0
19	171°01.6	126°49.0	15°23.9	72°04.2	24°20.0	270°41.0	-22°31.9	239°35.1	-21°36.0
20	186°04.1	141°48.5	15°24.8	87°04.9	24°19.9	285°43.8	-22°31.9	254°37.7	-21°36.1
21	201°06.5	156°47.9	15°25.7	102°05.6	24°19.8	300°46.6	-22°31.9	269°40.2	-21°36.1
22	216°09.0	171°47.4	15°26.7	117°06.3	24°19.7	315°49.3	-22°31.9	284°42.8	-21°36.1
23	231°11.5	186°46.9	15°27.6	132°07.0	24°19.6	330°52.1	-22°31.8	299°45.4	-21°36.1
	Mer.pass.:7:37:	v-0.5 d0.9 m-3.8		v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	246°13.9	201°46.3	15°28.5	147°07.7	24°19.5	345°54.9	-22°31.8	314°48.0	-21°36.1
1	261°16.4	216°45.8	15°29.4	162°08.4	24°19.4	0°57.7	-22°31.8	329°50.6	-21°36.2
2	276°18.8	231°45.2	15°30.4	177°09.1	24°19.3	16°00.5	-22°31.8	344°53.2	-21°36.2
3	291°21.3	246°44.7	15°31.3	192°09.8	24°19.2	31°03.3	-22°31.8	359°55.7	-21°36.2
4	306°23.8	261°44.1	15°32.2	207°10.5	24°19.1	46°06.1	-22°31.8	14°58.3	-21°36.2
5	321°26.2	276°43.6	15°33.1	222°11.2	24°19.1	61°08.9	-22°31.7	30°00.9	-21°36.2
6	336°28.7	291°43.1	15°34.0	237°11.9	24°19.0	76°11.7	-22°31.7	45°03.5	-21°36.2
7	351°31.2	306°42.5	15°35.0	252°12.6	24°18.9	91°14.4	-22°31.7	60°06.1	-21°36.3
8	6°33.6	321°42.0	15°35.9	267°13.3	24°18.8	106°17.2	-22°31.7	75°08.6	-21°36.3
9	21°36.1	336°41.4	15°36.8	282°14.0	24°18.7	121°20.0	-22°31.7	90°11.2	-21°36.3
10	36°38.6	351°40.9	15°37.7	297°14.7	24°18.6	136°22.8	-22°31.7	105°13.8	-21°36.3
11	51°41.0	6°40.3	15°38.6	312°15.4	24°18.5	151°25.6	-22°31.6	120°16.4	-21°36.3
12	66°43.5	21°39.8	15°39.6	327°16.2	24°18.4	166°28.4	-22°31.6	135°19.0	-21°36.4
13	81°46.0	36°39.2	15°40.5	342°16.9	24°18.3	181°31.2	-22°31.6	150°21.5	-21°36.4
14	96°48.4	51°38.7	15°41.4	357°17.6	24°18.2	196°34.0	-22°31.6	165°24.1	-21°36.4
15	111°50.9	66°38.1	15°42.3	12°18.3	24°18.1	211°36.8	-22°31.6	180°26.7	-21°36.4
16	126°53.3	81°37.6	15°43.2	27°19.0	24°18.0	226°39.6	-22°31.6	195°29.3	-21°36.4
17	141°55.8	96°37.0	15°44.1	42°19.7	24°17.8	241°42.4	-22°31.5	210°31.9	-21°36.5
18	156°58.3	111°36.5	15°45.0	57°20.4	24°17.7	256°45.1	-22°31.5	225°34.5	-21°36.5
19	172°00.7	126°35.9	15°46.0	72°21.1	24°17.6	271°47.9	-22°31.5	240°37.0	-21°36.5
20	187°03.2	141°35.4	15°46.9	87°21.8	24°17.5	286°50.7	-22°31.5	255°39.6	-21°36.5
21	202°05.7	156°34.8	15°47.8	102°22.5	24°17.4	301°53.5	-22°31.5	270°42.2	-21°36.5
22	217°08.1	171°34.3	15°48.7	117°23.2	24°17.3	316°56.3	-22°31.5	285°44.8	-21°36.5
23	232°10.6	186°33.7	15°49.6	132°23.9	24°17.2	331°59.1	-22°31.4	300°47.4	-21°36.6
	Mer.pass.:7:33:	v-0.5 d0.9 m-3.8		v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.4		v2.6 d-0.0 m0.3	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	247°13.1	201°33.2	15°50.5	147°24.6	24°17.1	347°01.9	-22°31.4	315°50.0	-21°36.6
1	262°15.5	216°32.6	15°51.4	162°25.3	24°17.0	2°04.7	-22°31.4	330°52.5	-21°36.6
2	277°18.0	231°32.0	15°52.3	177°26.0	24°16.9	17°07.5	-22°31.4	345°55.1	-21°36.6
3	292°20.4	246°31.5	15°53.2	192°26.7	24°16.8	32°10.3	-22°31.4	0°57.7	-21°36.6
4	307°22.9	261°30.9	15°54.1	207°27.4	24°16.7	47°13.1	-22°31.4	16°00.3	-21°36.7
5	322°25.4	276°30.4	15°55.0	222°28.2	24°16.6	62°15.9	-22°31.3	31°02.9	-21°36.7
6	337°27.8	291°29.8	15°55.9	237°28.9	24°16.5	77°18.6	-22°31.3	46°05.5	-21°36.7
7	352°30.3	306°29.3	15°56.8	252°29.6	24°16.4	92°21.4	-22°31.3	61°08.1	-21°36.7
8	7°32.8	321°28.7	15°57.8	267°30.3	24°16.3	107°24.2	-22°31.3	76°10.6	-21°36.7
9	22°35.2	336°28.2	15°58.7	282°31.0	24°16.2	122°27.0	-22°31.3	91°13.2	-21°36.8
10	37°37.7	351°27.6	15°59.6	297°31.7	24°16.1	137°29.8	-22°31.3	106°15.8	-21°36.8
11	52°40.2	6°27.0	16°00.5	312°32.4	24°16.0	152°32.6	-22°31.2	121°18.4	-21°36.8
12	67°42.6	21°26.5	16°01.4	327°33.1	24°15.8	167°35.4	-22°31.2	136°21.0	-21°36.8
13	82°45.1	36°25.9	16°02.3	342°33.8	24°15.7	182°38.2	-22°31.2	151°23.6	-21°36.8
14	97°47.6	51°25.4	16°03.2	357°34.5	24°15.6	197°41.0	-22°31.2	166°26.2	-21°36.8
15	112°50.0	66°24.8	16°04.1	12°35.2	24°15.5	212°43.8	-22°31.2	181°28.7	-21°36.9
16	127°52.5	81°24.2	16°05.0	27°35.9	24°15.4	227°46.6	-22°31.2	196°31.3	-21°36.9
17	142°54.9	96°23.7	16°05.9	42°36.6	24°15.3	242°49.4	-22°31.1	211°33.9	-21°36.9
18	157°57.4	111°23.1	16°06.7	57°37.3	24°15.2	257°52.2	-22°31.1	226°36.5	-21°36.9
19	172°59.9	126°22.5	16°07.6	72°38.1	24°15.1	272°55.0	-22°31.1	241°39.1	-21°36.9
20	188°02.3	141°22.0	16°08.5	87°38.8	24°15.0	287°57.8	-22°31.1	256°41.7	-21°37.0
21	203°04.8	156°21.4	16°09.4	102°39.5	24°14.9	303°00.6	-22°31.1	271°44.3	-21°37.0
22	218°07.3	171°20.9	16°10.3	117°40.2	24°14.7	318°03.3	-22°31.1	286°46.8	-21°37.0
23	233°09.7	186°20.3	16°11.2	132°40.9	24°14.6	333°06.1	-22°31.0	301°49.4	-21°37.0
	Mer.pass.:7:29:	v-0.6 d0.9 m-3.8		v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.3	

Stars

Star	SHA	Dec
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.9	-42°12.0
Schedar	349°36.2	56°38.2
Diphda	348°51.9	-17°52.9
Achernar	335°24.2	-57°08.3
Hamal	327°56.5	23°33.0
Polaris	316°26.9	89°20.5
Akamar	315°15.7	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°35.1	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°00.9
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.4
Canopus	263°54.9	-52°42.6
Sirius	258°30.4	-16°44.6
Adara	255°09.7	-29°00.2
Procyon	244°55.7	5°10.5
Pollux	243°23.0	27°58.7
Avior	234°16.8	-59°34.6
Suhail	222°49.6	-43°30.9
Miaplacidus	221°39.2	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.6	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.4	-63°12.6
Gacrux	171°56.1	-57°13.5
Alioth	166°16.8	55°51.6
Spica	158°26.7	-11°15.7
Alcaid	152°55.3	49°13.3
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.3
Rigil Kent.	139°45.6	-60°54.9
Zubenelg.	137°00.6	-16°07.3
Kochab	137°19.0	74°04.8
Alphecca	126°07.2	26°39.1
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.5
Sabik	102°07.6	-15°44.8
Shaula	96°16.0	-37°06.9
Rasalhague	96°02.4	12°32.9
Etamin	90°43.7	51°29.2
Kaus Aust.	83°38.1	-34°22.3
Vega	80°35.9	38°48.0
Nunki	75°53.0	-26°16.2
Altair	62°04.2	8°55.1
Peacock	53°12.6	-56°40.1
Deneb	49°28.5	45°20.7
Enif	33°43.1	9°57.7
Alnair	27°38.6	-46°51.8
Fomalhaut	15°19.6	-29°31.1
Scheat	13°49.5	28°11.0
Markab	13°34.4	15°18.4

2019/5/2	SHA	Mer.pass
Venus	316°44.4	10:32
Mars	261°36.0	14:12
Jupiter	99°33.2	01:01
Saturn	68°31.3	03:04

2019/5/2	SHA	Mer.pass
Venus	315°32.4	10:33
Mars	260°53.8	14:11
Jupiter	99°41.0	00:56
Saturn	68°34.1	03:00

2019/5/3	SHA	Mer.pass
Venus	314°20.1	10:34
Mars	260°11.6	14:10
Jupiter	99°48.8	00:52
Saturn	68°36.9	02:56

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
Tue							
0	180°42.1	21°22.5	251°57.2	15.3	-7°52.8	10.7	54.4
1	195°42.0	21°22.9	266°31.6	15.4	-7°42.2	10.7	54.4
2	210°42.0	21°23.3	281°05.9	15.4	-7°31.4	10.7	54.5
3	225°41.9	21°23.7	295°40.3	15.4	-7°20.7	10.8	54.5
4	240°41.8	21°24.1	310°14.7	15.4	-7°09.9	10.8	54.5
5	255°41.7	21°24.5	324°49.1	15.4	-6°59.1	10.8	54.5
6	270°41.7	21°25.0	339°23.5	15.4	-6°48.3	10.9	54.5
7	285°41.6	21°25.4	353°57.9	15.4	-6°37.4	10.9	54.5
8	300°41.5	21°25.8	8°32.3	15.4	-6°26.5	10.9	54.5
9	315°41.4	21°26.2	23°06.7	15.4	-6°15.5	11.0	54.5
10	330°41.4	21°26.6	37°41.2	15.4	-6°04.6	11.0	54.5
11	345°41.3	21°27.0	52°15.6	15.4	-5°53.6	11.0	54.6
12	0°41.2	21°27.4	66°50.0	15.4	-5°42.5	11.0	54.6
13	15°41.1	21°27.8	81°24.5	15.4	-5°31.5	11.1	54.6
14	30°41.0	21°28.2	95°58.9	15.4	-5°20.4	11.1	54.6
15	45°41.0	21°28.6	110°33.3	15.4	-5°09.3	11.1	54.6
16	60°40.9	21°29.0	125°07.8	15.4	-4°58.1	11.2	54.6
17	75°40.8	21°29.4	139°42.2	15.4	-4°47.0	11.2	54.6
18	90°40.7	21°29.8	154°16.7	15.4	-4°35.8	11.2	54.7
19	105°40.7	21°30.2	168°51.1	15.4	-4°24.6	11.2	54.7
20	120°40.6	21°30.6	183°25.5	15.4	-4°13.3	11.3	54.7
21	135°40.5	21°31.0	197°60.0	15.4	-4°02.1	11.3	54.7
22	150°40.4	21°31.4	212°34.4	15.4	-3°50.8	11.3	54.7
23	165°40.3	21°31.8	227°08.8	15.4	-3°39.5	11.3	54.7
	SD.=15.8	d=0.4			S.D.=14.8		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°40.3	21°32.2	241°43.2	15.4	-3°28.1	11.3	54.8
1	195°40.2	21°32.6	256°17.6	15.4	-3°16.8	11.4	54.8
2	210°40.1	21°33.0	270°52.0	15.4	-3°05.4	11.4	54.8
3	225°40.0	21°33.3	285°26.4	15.4	-2°54.0	11.4	54.8
4	240°39.9	21°33.7	300°00.8	15.4	-2°42.6	11.4	54.8
5	255°39.9	21°34.1	314°35.1	15.4	-2°31.1	11.4	54.8
6	270°39.8	21°34.5	329°09.5	15.3	-2°19.7	11.5	54.9
7	285°39.7	21°34.9	343°43.8	15.3	-2°08.2	11.5	54.9
8	300°39.6	21°35.3	358°18.2	15.3	-1°56.7	11.5	54.9
9	315°39.5	21°35.7	12°52.5	15.3	-1°45.2	11.5	54.9
10	330°39.4	21°36.1	27°26.8	15.3	-1°33.7	11.5	54.9
11	345°39.4	21°36.5	42°01.0	15.3	-1°22.1	11.5	55.0
12	0°39.3	21°36.9	56°35.3	15.3	-1°10.6	11.6	55.0
13	15°39.2	21°37.2	71°09.5	15.2	-0°59.0	11.6	55.0
14	30°39.1	21°37.6	85°43.8	15.2	-0°47.4	11.6	55.0
15	45°39.0	21°38.0	100°18.0	15.2	-0°35.8	11.6	55.0
16	60°38.9	21°38.4	114°52.2	15.2	-0°24.2	11.6	55.1
17	75°38.9	21°38.8	129°26.3	15.1	-0°12.6	11.6	55.1
18	90°38.8	21°39.2	144°00.5	15.1	-0°01.0	11.6	55.1
19	105°38.7	21°39.5	158°34.6	15.1	0°10.6	11.6	55.1
20	120°38.6	21°39.9	173°08.7	15.1	0°22.3	11.7	55.1
21	135°38.5	21°40.3	187°42.7	15.1	0°33.9	11.7	55.2
22	150°38.4	21°40.7	202°16.8	15.0	0°45.6	11.7	55.2
23	165°38.4	21°41.1	216°50.8	15.0	0°57.3	11.7	55.2
	SD.=15.8	d=0.4			S.D.=14.9		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°38.3	21°41.5	231°24.8	15.0	1°09.0	11.7	55.2
1	195°38.2	21°41.8	245°58.7	14.9	1°20.6	11.7	55.3
2	210°38.1	21°42.2	260°32.6	14.9	1°32.3	11.7	55.3
3	225°38.0	21°42.6	275°06.5	14.9	1°44.0	11.7	55.3
4	240°37.9	21°43.0	289°40.4	14.8	1°55.7	11.7	55.3
5	255°37.9	21°43.3	304°14.2	14.8	2°07.4	11.7	55.3
6	270°37.8	21°43.7	318°48.0	14.8	2°19.1	11.7	55.4
7	285°37.7	21°44.1	333°21.8	14.7	2°30.8	11.7	55.4
8	300°37.6	21°44.5	347°55.5	14.7	2°42.5	11.7	55.4
9	315°37.5	21°44.8	2°29.2	14.7	2°54.2	11.7	55.4
10	330°37.4	21°45.2	17°02.9	14.6	3°05.9	11.7	55.5
11	345°37.3	21°45.6	31°36.5	14.6	3°17.6	11.7	55.5
12	0°37.2	21°46.0	46°10.0	14.6	3°29.3	11.7	55.5
13	15°37.2	21°46.3	60°43.6	14.5	3°41.0	11.7	55.5
14	30°37.1	21°46.7	75°17.1	14.5	3°52.7	11.7	55.6
15	45°37.0	21°47.1	89°50.5	14.4	4°04.4	11.7	55.6
16	60°36.9	21°47.4	104°23.9	14.4	4°16.1	11.7	55.6
17	75°36.8	21°47.8	118°57.3	14.3	4°27.7	11.7	55.6
18	90°36.7	21°48.2	133°30.6	14.3	4°39.4	11.7	55.7
19	105°36.6	21°48.5	148°03.9	14.3	4°51.0	11.7	55.7
20	120°36.5	21°48.9	162°37.2	14.2	5°02.7	11.6	55.7
21	135°36.5	21°49.3	177°10.3	14.2	5°14.3	11.6	55.7
22	150°36.4	21°49.6	191°43.5	14.1	5°26.0	11.6	55.8
23	165°36.3	21°50.0	206°16.6	14.1	5°37.6	11.6	55.8
	SD.=15.8	d=0.4			S.D.=15.1		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:27	22:32	–:–	–:–
64	–:–	–:–	02:07	21:50	–:–	–:–
62	–:–	00:41	02:34	21:23	23:21	–:–
60	–:–	01:36	02:55	21:01	22:21	–:–
58	–:–	02:07	03:12	20:44	21:50	–:–
56	00:37	02:30	03:26	20:30	21:26	23:24
54	01:27	02:48	03:38	20:17	21:08	22:30
52	01:56	03:03	03:49	20:06	20:52	22:00
50	02:18	03:16	03:59	19:57	20:39	21:38
45	02:56	03:43	04:19	19:37	20:13	20:60
40	03:23	04:03	04:35	19:20	19:52	20:32
35	03:44	04:20	04:49	19:07	19:36	20:11
30	04:01	04:33	05:00	18:55	19:22	19:54
20	04:28	04:56	05:20	18:34	18:59	19:27
10	04:48	05:15	05:38	18:17	18:40	19:07
0	05:06	05:32	05:54	18:01	18:23	18:49
-10	05:21	05:47	06:10	17:45	18:08	18:34
-20	05:36	06:03	06:27	17:28	17:52	18:19
-30	05:51	06:20	06:46	17:09	17:35	18:04
-35	05:58	06:29	06:57	16:57	17:25	17:56
-40	06:07	06:40	07:10	16:45	17:14	17:48
-45	06:16	06:52	07:25	16:29	17:02	17:39
-50	06:26	07:06	07:44	16:11	16:48	17:29
-52	06:30	07:13	07:52	16:02	16:41	17:24
-54	06:35	07:20	08:02	15:52	16:34	17:19
-56	06:40	07:28	08:13	15:41	16:26	17:14
-58	06:46	07:37	08:26	15:28	16:17	17:08
-60	06:52	07:47	08:41	15:13	16:07	17:02

Lat.	Moonrise Tue	Moonrise Wed	Moonrise Thu	Moonset Tue	Moonset Wed	Moonset Thu
72	02:52	02:36	02:20	12:21	14:07	15:54
70	02:42	02:32	02:22	12:30	14:08	15:48
68	02:33	02:28	02:24	12:37	14:09	15:43
66	02:26	02:25	02:25	12:42	14:10	15:39
64	02:19	02:23	02:26	12:47	14:10	15:35
62	02:14	02:21	02:27	12:51	14:11	15:32
60	02:09	02:19	02:28	12:55	14:11	15:30
58	02:05	02:17	02:29	12:58	14:12	15:27
56	02:01	02:16	02:30	13:01	14:12	15:25
54	01:58	02:14	02:30	13:03	14:13	15:24
52	01:55	02:13	02:31	13:06	14:13	15:22
50	01:52	02:12	02:32	13:08	14:13	15:20
45	01:46	02:10	02:33	13:12	14:14	15:17
40	01:41	02:08	02:34	13:16	14:14	15:14
35	01:37	02:06	02:35	13:19	14:15	15:12
30	01:33	02:04	02:36	13:22	14:15	15:10
20	01:26	02:01	02:37	13:27	14:16	15:06
10	01:20	01:59	02:38	13:31	14:17	15:03
0	01:15	01:57	02:39	13:35	14:17	15:00
-10	01:09	01:55	02:41	13:39	14:18	14:57
-20	01:03	01:52	02:42	13:43	14:18	14:54
-30	00:56	01:49	02:43	13:48	14:19	14:51
-35	00:52	01:48	02:44	13:50	14:19	14:48
-40	00:48	01:46	02:45	13:53	14:20	14:46
-45	00:43	01:44	02:47	13:57	14:20	14:43
-50	00:36	01:42	02:48	14:01	14:21	14:40
-52	00:33	01:40	02:49	14:03	14:21	14:39
-54	00:30	01:39	02:49	14:05	14:21	14:37
-56	00:27	01:38	02:50	14:07	14:21	14:35
-58	00:23	01:36	02:51	14:10	14:22	14:33
-60	00:18	01:35	02:52	14:13	14:22	14:31

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
28	02:48	02:45	11:57	07:24	19:45	24(33%)
29	02:41	02:37	11:57	08:06	20:28	25(24%)
30	02:33	02:29	11:57	08:49	21:11	26(16%)

May 31, 01 ,02 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	248°12.2	201°19.7	16°12.1	147°41.6	24°14.5	348°08.9	-22°31.0	316°52.0	-21°37.0
1	263°14.7	216°19.2	16°13.0	162°42.3	24°14.4	3°11.7	-22°31.0	331°54.6	-21°37.1
2	278°17.1	231°18.6	16°13.9	177°43.0	24°14.3	18°14.5	-22°31.0	346°57.2	-21°37.1
3	293°19.6	246°18.0	16°14.8	192°43.7	24°14.2	33°17.3	-22°31.0	1°59.8	-21°37.1
4	308°22.0	261°17.5	16°15.7	207°44.4	24°14.1	48°20.1	-22°30.9	17°02.4	-21°37.1
5	323°24.5	276°16.9	16°16.6	222°45.1	24°14.0	63°22.9	-22°30.9	32°05.0	-21°37.1
6	338°27.0	291°16.3	16°17.5	237°45.8	24°13.8	78°25.7	-22°30.9	47°07.5	-21°37.2
7	353°29.4	306°15.8	16°18.3	252°46.6	24°13.7	93°28.5	-22°30.9	62°10.1	-21°37.2
8	8°31.9	321°15.2	16°19.2	267°47.3	24°13.6	108°31.3	-22°30.9	77°12.7	-21°37.2
9	23°34.4	336°14.6	16°20.1	282°48.0	24°13.5	123°34.1	-22°30.9	92°15.3	-21°37.2
10	38°36.8	351°14.1	16°21.0	297°48.7	24°13.4	138°36.9	-22°30.8	107°17.9	-21°37.2
11	53°39.3	6°13.5	16°21.9	312°49.4	24°13.3	153°39.7	-22°30.8	122°20.5	-21°37.3
12	68°41.8	21°12.9	16°22.8	327°50.1	24°13.2	168°42.5	-22°30.8	137°23.1	-21°37.3
13	83°44.2	36°12.3	16°23.7	342°50.8	24°13.0	183°45.3	-22°30.8	152°25.7	-21°37.3
14	98°46.7	51°11.8	16°24.5	357°51.5	24°12.9	198°48.1	-22°30.8	167°28.3	-21°37.3
15	113°49.2	66°11.2	16°25.4	12°52.2	24°12.8	213°50.9	-22°30.8	182°30.8	-21°37.3
16	128°51.6	81°10.6	16°26.3	27°52.9	24°12.7	228°53.7	-22°30.7	197°33.4	-21°37.3
17	143°54.1	96°10.1	16°27.2	42°53.6	24°12.6	243°56.5	-22°30.7	212°36.0	-21°37.4
18	158°56.5	111°09.5	16°28.1	57°54.4	24°12.5	258°59.3	-22°30.7	227°38.6	-21°37.4
19	173°59.0	126°08.9	16°28.9	72°55.1	24°12.3	274°02.1	-22°30.7	242°41.2	-21°37.4
20	189°01.5	141°08.3	16°29.8	87°55.8	24°12.2	289°04.8	-22°30.7	257°43.8	-21°37.4
21	204°03.9	156°07.8	16°30.7	102°56.5	24°12.1	304°07.6	-22°30.7	272°46.4	-21°37.4
22	219°06.4	171°07.2	16°31.6	117°57.2	24°12.0	319°10.4	-22°30.6	287°49.0	-21°37.5
23	234°08.9	186°06.6	16°32.5	132°57.9	24°11.9	334°13.2	-22°30.6	302°51.6	-21°37.5
Mer.pass.:7:25:		v-0.6 d0.9 m-3.8		v0.7 d-0.1 m1.7		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.3	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	249°11.3	201°06.0	16°33.3	147°58.6	24°11.7	349°16.0	-22°30.6	317°54.2	-21°37.5
1	264°13.8	216°05.4	16°34.2	162°59.3	24°11.6	4°18.8	-22°30.6	332°56.7	-21°37.5
2	279°16.3	231°04.9	16°35.1	178°00.0	24°11.5	19°21.6	-22°30.6	347°59.3	-21°37.5
3	294°18.7	246°04.3	16°36.0	193°00.7	24°11.4	34°24.4	-22°30.6	3°01.9	-21°37.6
4	309°21.2	261°03.7	16°36.8	208°01.4	24°11.3	49°27.2	-22°30.5	18°04.5	-21°37.6
5	324°23.7	276°03.1	16°37.7	223°02.2	24°11.1	64°30.0	-22°30.5	33°07.1	-21°37.6
6	339°26.1	291°02.6	16°38.6	238°02.9	24°11.0	79°32.8	-22°30.5	48°09.7	-21°37.6
7	354°28.6	306°02.0	16°39.4	253°03.6	24°10.9	94°35.6	-22°30.5	63°12.3	-21°37.6
8	9°31.0	321°01.4	16°40.3	268°04.3	24°10.8	109°38.4	-22°30.5	78°14.9	-21°37.7
9	24°33.5	336°00.8	16°41.2	283°05.0	24°10.6	124°41.2	-22°30.4	93°17.5	-21°37.7
10	39°36.0	351°00.2	16°42.1	298°05.7	24°10.5	139°44.0	-22°30.4	108°20.1	-21°37.7
11	54°38.4	5°59.7	16°42.9	313°06.4	24°10.4	154°46.8	-22°30.4	123°22.7	-21°37.7
12	69°40.9	20°59.1	16°43.8	328°07.1	24°10.3	169°49.6	-22°30.4	138°25.3	-21°37.7
13	84°43.4	35°58.5	16°44.7	343°07.8	24°10.1	184°52.4	-22°30.4	153°27.8	-21°37.8
14	99°45.8	50°57.9	16°45.5	358°08.6	24°10.0	199°55.2	-22°30.4	168°30.4	-21°37.8
15	114°48.3	65°57.3	16°46.4	13°09.3	24°09.9	214°58.0	-22°30.3	183°33.0	-21°37.8
16	129°50.8	80°56.7	16°47.2	28°10.0	24°09.8	230°00.8	-22°30.3	198°35.6	-21°37.8
17	144°53.2	95°56.2	16°48.1	43°10.7	24°09.6	245°03.6	-22°30.3	213°38.2	-21°37.8
18	159°55.7	110°55.6	16°49.0	58°11.4	24°09.5	260°06.4	-22°30.3	228°40.8	-21°37.9
19	174°58.2	125°55.0	16°49.8	73°12.1	24°09.4	275°09.2	-22°30.3	243°43.4	-21°37.9
20	190°00.6	140°54.4	16°50.7	88°12.8	24°09.3	290°12.0	-22°30.3	258°46.0	-21°37.9
21	205°03.1	155°53.8	16°51.6	103°13.5	24°09.1	305°14.8	-22°30.2	273°48.6	-21°37.9
22	220°05.5	170°53.2	16°52.4	118°14.2	24°09.0	320°17.6	-22°30.2	288°51.2	-21°37.9
23	235°08.0	185°52.6	16°53.3	133°15.0	24°08.9	335°20.4	-22°30.2	303°53.8	-21°38.0
Mer.pass.:7:22:		v-0.6 d0.9 m-3.8		v0.7 d-0.1 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.3	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	250°10.5	200°52.1	16°54.1	148°15.7	24°08.8	350°23.2	-22°30.2	318°56.4	-21°38.0
1	265°12.9	215°51.5	16°55.0	163°16.4	24°08.6	5°26.0	-22°30.2	333°59.0	-21°38.0
2	280°15.4	230°50.9	16°55.9	178°17.1	24°08.5	20°28.8	-22°30.1	349°01.6	-21°38.0
3	295°17.9	245°50.3	16°56.7	193°17.8	24°08.4	35°31.6	-22°30.1	4°04.2	-21°38.0
4	310°20.3	260°49.7	16°57.6	208°18.5	24°08.2	50°34.4	-22°30.1	19°06.7	-21°38.1
5	325°22.8	275°49.1	16°58.4	223°19.2	24°08.1	65°37.2	-22°30.1	34°09.3	-21°38.1
6	340°25.3	290°48.5	16°59.3	238°19.9	24°08.0	80°40.0	-22°30.1	49°11.9	-21°38.1
7	355°27.7	305°47.9	17°00.1	253°20.7	24°07.9	95°42.8	-22°30.1	64°14.5	-21°38.1
8	10°30.2	320°47.3	17°01.0	268°21.4	24°07.7	110°45.6	-22°30.0	79°17.1	-21°38.1
9	25°32.6	335°46.7	17°01.8	283°22.1	24°07.6	125°48.4	-22°30.0	94°19.7	-21°38.2
10	40°35.1	350°46.1	17°02.7	298°22.8	24°07.5	140°51.2	-22°30.0	109°22.3	-21°38.2
11	55°37.6	5°45.6	17°03.5	313°23.5	24°07.3	155°54.0	-22°30.0	124°24.9	-21°38.2
12	70°40.0	20°45.0	17°04.4	328°24.2	24°07.2	170°56.8	-22°30.0	139°27.5	-21°38.2
13	85°42.5	35°44.4	17°05.2	343°24.9	24°07.1	185°59.6	-22°30.0	154°30.1	-21°38.2
14	100°45.0	50°43.8	17°06.1	358°25.6	24°06.9	201°02.4	-22°29.9	169°32.7	-21°38.3
15	115°47.4	65°43.2	17°06.9	13°26.4	24°06.8	216°05.2	-22°29.9	184°35.3	-21°38.3
16	130°49.9	80°42.6	17°07.8	28°27.1	24°06.7	231°08.0	-22°29.9	199°37.9	-21°38.3
17	145°52.4	95°42.0	17°08.6	43°27.8	24°06.5	246°10.8	-22°29.9	214°40.5	-21°38.3
18	160°54.8	110°41.4	17°09.5	58°28.5	24°06.4	261°13.6	-22°29.9	229°43.1	-21°38.3
19	175°57.3	125°40.8	17°10.3	73°29.2	24°06.3	276°16.4	-22°29.8	244°45.7	-21°38.4
20	190°59.8	140°40.2	17°11.2	88°29.9	24°06.1	291°19.2	-22°29.8	259°48.3	-21°38.4
21	206°02.2	155°39.6	17°12.0	103°30.6	24°06.0	306°22.0	-22°29.8	274°50.9	-21°38.4
22	221°04.7	170°39.0	17°12.8	118°31.3	24°05.9	321°24.8	-22°29.8	289°53.5	-21°38.4
23	236°07.1	185°38.4	17°13.7	133°32.1	24°05.7	336°27.6	-22°29.8	304°56.1	-21°38.4
Mer.pass.:7:18:		v-0.6 d0.9 m-3.8		v0.7 d-0.1 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.3	

Stars	SHA	Dec
Alpheratz	357°39.5	29°11.6
Ankaa	353°11.9	-42°12.0
Schedar	349°36.2	56°38.2
Diphda	348°51.9	-17°52.9
Achernar	335°24.2	-57°08.3
Hamal	327°56.5	23°33.0
Polaris	316°26.2	89°20.5
Akamar	315°15.7	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°35.0	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°00.9
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.3	7°24.4
Canopus	263°54.9	-52°42.6
Sirius	258°30.4	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.5
Pollux	243°23.0	27°58.7
Avior	234°16.8	-59°34.6
Suhail	222°49.7	-43°30.9
Miaplacidus	221°39.3	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.7	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.5	-63°12.6
Gacrux	171°56.1	-57°13.5
Alioth	166°16.8	55°51.6
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.3
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.6	-60°54.9
Zubenelg.	137°00.6	-16°07.3
Kochab	137°19.0	74°04.8
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°16.0	-37°06.9
Rasalhague	96°02.4	12°32.9
Etamin	90°43.7	51°29.2
Kaus Aust.	83°38.1	-34°22.3
Vega	80°35.9	38°48.0
Nunki	75°53.0	-26°16.2
Altair	62°04.1	8°55.1
Peacock	53°12.5	-56°40.1
Deneb	49°28.5	45°20.8
Enif	33°43.1	9°57.7
Alnair	27°38.6	-46°51.8
Fomalhaut	15°19.6	-29°31.1
Scheat	13°49.5	28°11.0
Markab	13°34.4	15°18.4

2019/5/3	**SHA**	**Mer.pass**
Venus	313°07.5	10:35
Mars	259°29.4	14:09
Jupiter	99°56.7	00:47
Saturn	68°39.8	02:52

2019/6/1	**SHA**	**Mer.pass**
Venus	311°54.7	10:36
Mars	258°47.3	14:07
Jupiter	100°04.7	00:43
Saturn	68°42.8	02:48

2019/6/2	**SHA**	**Mer.pass**
Venus	310°41.6	10:37
Mars	258°05.2	14:06
Jupiter	100°12.7	00:38
Saturn	68°45.9	02:44

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°36.2	21°50.4	220°49.6	14.0	5°49.2	11.6	55.8
1	195°36.1	21°50.7	235°22.6	14.0	6°00.8	11.6	55.8
2	210°36.0	21°51.1	249°55.6	13.9	6°12.3	11.6	55.9
3	225°35.9	21°51.5	264°28.4	13.9	6°23.9	11.6	55.9
4	240°35.8	21°51.8	279°01.3	13.8	6°35.4	11.5	55.9
5	255°35.7	21°52.2	293°34.1	13.8	6°47.0	11.5	55.9
6	270°35.6	21°52.5	308°06.8	13.7	6°58.5	11.5	56.0
7	285°35.6	21°52.9	322°39.5	13.6	7°10.0	11.5	56.0
8	300°35.5	21°53.3	337°12.1	13.6	7°21.4	11.5	56.0
9	315°35.4	21°53.6	351°44.6	13.5	7°32.9	11.4	56.1
10	330°35.3	21°54.0	6°17.1	13.5	7°44.3	11.4	56.1
11	345°35.2	21°54.3	20°49.6	13.4	7°55.7	11.4	56.1
12	0°35.1	21°54.7	35°22.0	13.4	8°07.1	11.4	56.1
13	15°35.0	21°55.0	49°54.3	13.3	8°18.4	11.3	56.2
14	30°34.9	21°55.4	64°26.6	13.2	8°29.8	11.3	56.2
15	45°34.8	21°55.7	78°58.8	13.2	8°41.1	11.3	56.2
16	60°34.7	21°56.1	93°30.9	13.1	8°52.4	11.3	56.2
17	75°34.6	21°56.4	108°03.0	13.0	9°03.6	11.2	56.3
18	90°34.5	21°56.8	122°35.0	13.0	9°14.8	11.2	56.3
19	105°34.5	21°57.2	137°06.9	12.9	9°26.0	11.2	56.3
20	120°34.4	21°57.5	151°38.8	12.8	9°37.2	11.1	56.4
21	135°34.3	21°57.9	166°10.6	12.8	9°48.3	11.1	56.4
22	150°34.2	21°58.2	180°42.4	12.7	9°59.4	11.1	56.4
23	165°34.1	21°58.5	195°14.1	12.6	10°10.4	11.0	56.4
	SD.=15.8	d=0.4			S.D.=15.2		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°34.0	21°58.9	209°45.7	12.6	10°21.4	11.0	56.5
1	195°33.9	21°59.2	224°17.2	12.5	10°32.4	11.0	56.5
2	210°33.8	21°59.6	238°48.7	12.4	10°43.4	10.9	56.5
3	225°33.7	21°59.9	253°20.1	12.4	10°54.3	10.9	56.6
4	240°33.6	22°00.3	267°51.4	12.3	11°05.1	10.8	56.6
5	255°33.5	22°00.6	282°22.7	12.2	11°16.0	10.8	56.6
6	270°33.4	22°01.0	296°53.9	12.1	11°26.7	10.8	56.6
7	285°33.3	22°01.3	311°25.0	12.1	11°37.5	10.7	56.7
8	300°33.2	22°01.7	325°56.0	12.0	11°48.2	10.7	56.7
9	315°33.1	22°02.0	340°27.0	11.9	11°58.8	10.6	56.7
10	330°33.0	22°02.3	354°57.9	11.9	12°09.4	10.6	56.8
11	345°32.9	22°02.7	9°28.7	11.8	12°20.0	10.5	56.8
12	0°32.8	22°03.0	23°59.4	11.7	12°30.5	10.5	56.8
13	15°32.7	22°03.4	38°30.1	11.6	12°40.9	10.4	56.8
14	30°32.7	22°03.7	53°00.7	11.5	12°51.3	10.4	56.9
15	45°32.6	22°04.0	67°31.2	11.5	13°01.6	10.3	56.9
16	60°32.5	22°04.4	82°01.6	11.4	13°11.9	10.3	56.9
17	75°32.4	22°04.7	96°31.9	11.3	13°22.2	10.2	57.0
18	90°32.3	22°05.0	111°02.2	11.2	13°32.4	10.1	57.0
19	105°32.2	22°05.4	125°32.4	11.1	13°42.5	10.1	57.0
20	120°32.1	22°05.7	140°02.5	11.1	13°52.5	10.0	57.0
21	135°32.0	22°06.0	154°32.5	11.0	14°02.5	10.0	57.1
22	150°31.9	22°06.4	169°02.5	10.9	14°12.5	9.9	57.1
23	165°31.8	22°06.7	183°32.3	10.8	14°22.4	9.8	57.1
	SD.=15.8	d=0.3			S.D.=15.4		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°31.7	22°07.0	198°02.1	10.7	14°32.2	9.8	57.2
1	195°31.6	22°07.4	212°31.8	10.7	14°41.9	9.7	57.2
2	210°31.5	22°07.7	227°01.4	10.6	14°51.6	9.6	57.2
3	225°31.4	22°08.0	241°31.0	10.5	15°01.2	9.6	57.2
4	240°31.3	22°08.4	256°00.4	10.4	15°10.8	9.5	57.3
5	255°31.2	22°08.7	270°29.8	10.3	15°20.2	9.4	57.3
6	270°31.1	22°09.0	284°59.1	10.2	15°29.6	9.4	57.3
7	285°31.0	22°09.4	299°28.3	10.2	15°39.0	9.3	57.4
8	300°30.9	22°09.7	313°57.4	10.1	15°48.2	9.2	57.4
9	315°30.8	22°10.0	328°26.4	10.0	15°57.4	9.1	57.4
10	330°30.7	22°10.3	342°55.4	9.9	16°06.5	9.1	57.4
11	345°30.6	22°10.7	357°24.2	9.8	16°15.5	9.0	57.5
12	0°30.5	22°11.0	11°53.0	9.7	16°24.5	8.9	57.5
13	15°30.4	22°11.3	26°21.7	9.6	16°33.3	8.8	57.5
14	30°30.3	22°11.6	40°50.3	9.6	16°42.1	8.7	57.6
15	45°30.2	22°11.9	55°18.8	9.5	16°50.8	8.7	57.6
16	60°30.1	22°12.3	69°47.3	9.4	16°59.4	8.6	57.6
17	75°30.0	22°12.6	84°15.6	9.3	17°08.0	8.5	57.6
18	90°29.9	22°12.9	98°43.9	9.2	17°16.4	8.4	57.7
19	105°29.8	22°13.2	113°12.0	9.1	17°24.8	8.3	57.7
20	120°29.7	22°13.5	127°40.1	9.1	17°33.0	8.2	57.7
21	135°29.6	22°13.9	142°08.2	9.0	17°41.2	8.1	57.7
22	150°29.5	22°14.2	156°36.1	8.9	17°49.3	8.0	57.8
23	165°29.4	22°14.5	171°03.9	8.8	17°57.3	7.9	57.8
	SD.=15.8	d=0.3			S.D.=15.6		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:14	22:46	–:–	–:–
64	–:–	–:–	01:59	21:59	–:–	–:–
62	–:–	00:07	02:28	21:29	–:–	–:–
60	–:–	01:27	02:50	21:07	22:31	–:–
58	–:–	02:01	03:08	20:49	21:56	–:–
56	00:06	02:25	03:22	20:34	21:32	–:–
54	01:19	02:44	03:35	20:21	21:13	22:39
52	01:51	02:60	03:46	20:10	20:57	22:07
50	02:13	03:14	03:56	19:60	20:43	21:44
45	02:53	03:41	04:17	19:39	20:16	21:03
40	03:21	04:01	04:33	19:22	19:55	20:35
35	03:42	04:18	04:47	19:08	19:38	20:14
30	03:60	04:33	04:60	18:56	19:23	19:56
20	04:27	04:56	05:20	18:36	18:60	19:29
10	04:48	05:15	05:38	18:18	18:41	19:08
0	05:06	05:32	05:54	18:01	18:24	18:50
-10	05:22	05:48	06:10	17:45	18:08	18:34
-20	05:37	06:04	06:28	17:28	17:52	18:19
-30	05:52	06:21	06:48	17:08	17:34	18:04
-35	05:60	06:31	06:59	16:56	17:24	17:56
-40	06:08	06:42	07:12	16:43	17:13	17:47
-45	06:18	06:55	07:28	16:28	17:01	17:38
-50	06:28	07:09	07:47	16:09	16:46	17:27
-52	06:33	07:16	07:56	15:59	16:39	17:22
-54	06:38	07:23	08:06	15:49	16:32	17:17
-56	06:44	07:32	08:17	15:38	16:24	17:12
-58	06:50	07:41	08:31	15:25	16:14	17:06
-60	06:56	07:51	08:46	15:09	16:04	16:59

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	02:04	01:44	01:17	17:47	19:55	23:03
70	02:12	02:01	01:47	17:33	19:26	21:36
68	02:19	02:14	02:09	17:21	19:05	20:57
66	02:25	02:25	02:27	17:11	18:49	20:31
64	02:30	02:35	02:42	17:03	18:35	20:10
62	02:34	02:43	02:54	16:56	18:24	19:53
60	02:38	02:50	03:04	16:50	18:14	19:40
58	02:41	02:56	03:13	16:45	18:06	19:28
56	02:44	03:01	03:22	16:41	17:58	19:18
54	02:47	03:06	03:29	16:37	17:52	19:09
52	02:50	03:11	03:35	16:33	17:46	19:01
50	02:52	03:15	03:41	16:29	17:41	18:54
45	02:57	03:23	03:54	16:22	17:29	18:39
40	03:01	03:31	04:04	16:16	17:20	18:26
35	03:05	03:37	04:13	16:11	17:12	18:15
30	03:08	03:43	04:21	16:06	17:05	18:06
20	03:14	03:53	04:35	15:58	16:53	17:50
10	03:19	04:01	04:47	15:51	16:42	17:36
0	03:23	04:09	04:58	15:45	16:32	17:23
-10	03:28	04:18	05:10	15:39	16:23	17:10
-20	03:33	04:26	05:22	15:32	16:12	16:56
-30	03:39	04:37	05:37	15:24	16:00	16:41
-35	03:42	04:42	05:45	15:19	15:53	16:32
-40	03:46	04:49	05:54	15:14	15:46	16:21
-45	03:51	04:57	06:05	15:08	15:36	16:09
-50	03:56	05:06	06:19	15:01	15:26	15:54
-52	03:59	05:11	06:25	14:58	15:21	15:48
-54	04:01	05:16	06:32	14:55	15:15	15:40
-56	04:04	05:21	06:40	14:51	15:09	15:32
-58	04:08	05:27	06:49	14:46	15:02	15:22
-60	04:12	05:34	06:59	14:42	14:54	15:11

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
31	02:25	02:20	11:57	09:34	21:57	27(10%)
1	02:16	02:11	11:57	10:20	22:45	28(4%)
2	02:07	02:02	11:57	11:10	23:37	29(1%)

June 03, 04 ,05 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	251°09.6	200°37.8	17°14.5	148°32.8	24°05.6	351°30.4	-22°29.8	319°58.7	-21°38.5
1	266°12.1	215°37.2	17°15.4	163°33.5	24°05.5	6°33.2	-22°29.7	335°01.3	-21°38.5
2	281°14.5	230°36.6	17°16.2	178°34.2	24°05.3	21°36.0	-22°29.7	350°03.9	-21°38.5
3	296°17.0	245°36.0	17°17.1	193°34.9	24°05.2	36°38.8	-22°29.7	5°06.5	-21°38.5
4	311°19.5	260°35.4	17°17.9	208°35.6	24°05.1	51°41.6	-22°29.7	20°09.1	-21°38.6
5	326°21.9	275°34.8	17°18.7	223°36.3	24°04.9	66°44.4	-22°29.7	35°11.7	-21°38.6
6	341°24.4	290°34.2	17°19.6	238°37.1	24°04.8	81°47.2	-22°29.6	50°14.3	-21°38.6
7	356°26.9	305°33.6	17°20.4	253°37.8	24°04.6	96°50.0	-22°29.6	65°16.9	-21°38.6
8	11°29.3	320°33.0	17°21.2	268°38.5	24°04.5	111°52.8	-22°29.6	80°19.4	-21°38.6
9	26°31.8	335°32.4	17°22.1	283°39.2	24°04.4	126°55.6	-22°29.6	95°22.0	-21°38.7
10	41°34.3	350°31.8	17°22.9	298°39.9	24°04.2	141°58.4	-22°29.6	110°24.6	-21°38.7
11	56°36.7	5°31.2	17°23.7	313°40.6	24°04.1	157°01.2	-22°29.6	125°27.2	-21°38.7
12	71°39.2	20°30.6	17°24.6	328°41.3	24°03.9	172°04.0	-22°29.5	140°29.8	-21°38.7
13	86°41.6	35°30.0	17°25.4	343°42.1	24°03.8	187°06.8	-22°29.5	155°32.4	-21°38.7
14	101°44.1	50°29.4	17°26.2	358°42.8	24°03.7	202°09.6	-22°29.5	170°35.0	-21°38.8
15	116°46.6	65°28.8	17°27.1	13°43.5	24°03.5	217°12.4	-22°29.5	185°37.6	-21°38.8
16	131°49.0	80°28.2	17°27.9	28°44.2	24°03.4	232°15.2	-22°29.5	200°40.2	-21°38.8
17	146°51.5	95°27.5	17°28.7	43°44.9	24°03.2	247°18.0	-22°29.4	215°42.8	-21°38.8
18	161°54.0	110°26.9	17°29.5	58°45.6	24°03.1	262°20.8	-22°29.4	230°45.4	-21°38.8
19	176°56.4	125°26.3	17°30.4	73°46.4	24°03.0	277°23.6	-22°29.4	245°48.0	-21°38.9
20	191°58.9	140°25.7	17°31.2	88°47.1	24°02.8	292°26.5	-22°29.4	260°50.6	-21°38.9
21	207°01.4	155°25.1	17°32.0	103°47.8	24°02.7	307°29.3	-22°29.4	275°53.2	-21°38.9
22	222°03.8	170°24.5	17°32.8	118°48.5	24°02.5	322°32.1	-22°29.4	290°55.8	-21°38.9
23	237°06.3	185°23.9	17°33.7	133°49.2	24°02.4	337°34.9	-22°29.3	305°58.4	-21°38.9
Mer.pass.:7:14:		v-0.6 d0.8 m-3.8		v0.7 d-0.1 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.3	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	252°08.8	200°23.3	17°34.5	148°49.9	24°02.3	352°37.7	-22°29.3	321°01.0	-21°39.0
1	267°11.2	215°22.7	17°35.3	163°50.6	24°02.1	7°40.5	-22°29.3	336°03.6	-21°39.0
2	282°13.7	230°22.1	17°36.1	178°51.4	24°02.0	22°43.3	-22°29.3	351°06.2	-21°39.0
3	297°16.1	245°21.4	17°37.0	193°52.1	24°01.8	37°46.1	-22°29.3	6°08.8	-21°39.0
4	312°18.6	260°20.8	17°37.8	208°52.8	24°01.7	52°48.9	-22°29.2	21°11.4	-21°39.0
5	327°21.1	275°20.2	17°38.6	223°53.5	24°01.5	67°51.7	-22°29.2	36°14.0	-21°39.1
6	342°23.5	290°19.6	17°39.4	238°54.2	24°01.4	82°54.5	-22°29.2	51°16.6	-21°39.1
7	357°26.0	305°19.0	17°40.2	253°54.9	24°01.2	97°57.3	-22°29.2	66°19.2	-21°39.1
8	12°28.5	320°18.4	17°41.1	268°55.7	24°01.1	113°00.1	-22°29.2	81°21.8	-21°39.1
9	27°30.9	335°17.8	17°41.9	283°56.4	24°01.0	128°02.9	-22°29.2	96°24.4	-21°39.2
10	42°33.4	350°17.1	17°42.7	298°57.1	24°00.8	143°05.7	-22°29.1	111°27.0	-21°39.2
11	57°35.9	5°16.5	17°43.5	313°57.8	24°00.7	158°08.5	-22°29.1	126°29.7	-21°39.2
12	72°38.3	20°15.9	17°44.3	328°58.5	24°00.5	173°11.3	-22°29.1	141°32.3	-21°39.2
13	87°40.8	35°15.3	17°45.1	343°59.2	24°00.4	188°14.1	-22°29.1	156°34.9	-21°39.2
14	102°43.3	50°14.7	17°45.9	358°60.0	24°00.2	203°16.9	-22°29.1	171°37.5	-21°39.3
15	117°45.7	65°14.1	17°46.7	14°00.7	24°00.1	218°19.7	-22°29.0	186°40.1	-21°39.3
16	132°48.2	80°13.4	17°47.6	29°01.4	23°59.9	233°22.5	-22°29.0	201°42.7	-21°39.3
17	147°50.6	95°12.8	17°48.4	44°02.1	23°59.8	248°25.3	-22°29.0	216°45.3	-21°39.3
18	162°53.1	110°12.2	17°49.2	59°02.8	23°59.6	263°28.1	-22°29.0	231°47.9	-21°39.3
19	177°55.6	125°11.6	17°50.0	74°03.6	23°59.5	278°30.9	-22°29.0	246°50.5	-21°39.4
20	192°58.0	140°11.0	17°50.8	89°04.3	23°59.3	293°33.7	-22°29.0	261°53.1	-21°39.4
21	208°00.5	155°10.3	17°51.6	104°05.0	23°59.2	308°36.5	-22°28.9	276°55.7	-21°39.4
22	223°03.0	170°09.7	17°52.4	119°05.7	23°59.0	323°39.4	-22°28.9	291°58.3	-21°39.4
23	238°05.4	185°09.1	17°53.2	134°06.4	23°58.9	338°42.2	-22°28.9	307°00.9	-21°39.5
Mer.pass.:7:10:		v-0.6 d0.8 m-3.8		v0.7 d-0.1 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	253°07.9	200°08.5	17°54.0	149°07.1	23°58.7	353°45.0	-22°28.9	322°03.5	-21°39.5
1	268°10.4	215°07.9	17°54.8	164°07.9	23°58.6	8°47.8	-22°28.9	337°06.1	-21°39.5
2	283°12.8	230°07.2	17°55.6	179°08.6	23°58.4	23°50.6	-22°28.8	352°08.7	-21°39.5
3	298°15.3	245°06.6	17°56.4	194°09.3	23°58.3	38°53.4	-22°28.8	7°11.3	-21°39.5
4	313°17.7	260°06.0	17°57.2	209°10.0	23°58.1	53°56.2	-22°28.8	22°13.9	-21°39.6
5	328°20.2	275°05.4	17°58.0	224°10.7	23°58.0	68°59.0	-22°28.8	37°16.5	-21°39.6
6	343°22.7	290°04.7	17°58.8	239°11.5	23°57.8	84°01.8	-22°28.8	52°19.1	-21°39.6
7	358°25.1	305°04.1	17°59.6	254°12.2	23°57.7	99°04.6	-22°28.7	67°21.7	-21°39.6
8	13°27.6	320°03.5	18°00.4	269°12.9	23°57.5	114°07.4	-22°28.7	82°24.3	-21°39.6
9	28°30.1	335°02.9	18°01.2	284°13.6	23°57.4	129°10.2	-22°28.7	97°26.9	-21°39.7
10	43°32.5	350°02.2	18°02.0	299°14.3	23°57.2	144°13.0	-22°28.7	112°29.5	-21°39.7
11	58°35.0	5°01.6	18°02.8	314°15.0	23°57.0	159°15.8	-22°28.7	127°32.1	-21°39.7
12	73°37.5	20°01.0	18°03.6	329°15.8	23°56.9	174°18.6	-22°28.7	142°34.7	-21°39.7
13	88°39.9	35°00.4	18°04.4	344°16.5	23°56.7	189°21.4	-22°28.6	157°37.3	-21°39.8
14	103°42.4	49°59.7	18°05.2	359°17.2	23°56.6	204°24.2	-22°28.6	172°39.9	-21°39.8
15	118°44.9	64°59.1	18°06.0	14°17.9	23°56.4	219°27.0	-22°28.6	187°42.6	-21°39.8
16	133°47.3	79°58.5	18°06.8	29°18.6	23°56.3	234°29.8	-22°28.6	202°45.2	-21°39.8
17	148°49.8	94°57.8	18°07.6	44°19.4	23°56.1	249°32.6	-22°28.6	217°47.8	-21°39.8
18	163°52.2	109°57.2	18°08.4	59°20.1	23°56.0	264°35.5	-22°28.5	232°50.4	-21°39.9
19	178°54.7	124°56.6	18°09.2	74°20.8	23°55.8	279°38.3	-22°28.5	247°53.0	-21°39.9
20	193°57.2	139°55.9	18°09.9	89°21.5	23°55.6	294°41.1	-22°28.5	262°55.6	-21°39.9
21	208°59.6	154°55.3	18°10.7	104°22.2	23°55.5	309°43.9	-22°28.5	277°58.2	-21°39.9
22	224°02.1	169°54.7	18°11.5	119°23.0	23°55.3	324°46.7	-22°28.5	293°00.8	-21°39.9
23	239°04.6	184°54.0	18°12.3	134°23.7	23°55.2	339°49.5	-22°28.4	308°03.4	-21°40.0
Mer.pass.:7:06:		v-0.6 d0.8 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.6
Ankaa	353°11.9	-42°12.0
Schedar	349°36.2	56°38.2
Diphda	348°51.9	-17°52.9
Achernar	335°24.2	-57°08.2
Hamal	327°56.5	23°33.0
Polaris	316°25.2	89°20.5
Akamar	315°15.6	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°35.0	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°11.0
Capella	280°29.0	46°00.9
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.6
Sirius	258°30.4	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.8	-59°34.6
Suhail	222°49.7	-43°30.9
Miaplacidus	221°39.3	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.7	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.5	-63°12.6
Gacrux	171°56.1	-57°13.5
Alioth	166°16.9	55°51.6
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.3
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.6	-60°54.9
Zubenelg.	137°00.6	-16°07.2
Kochab	137°19.0	74°04.8
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°16.0	-37°06.9
Rasalhague	96°02.4	12°32.9
Etamin	90°43.7	51°29.2
Kaus Aust.	83°38.0	-34°22.3
Vega	80°35.9	38°48.0
Nunki	75°53.0	-26°16.2
Altair	62°04.1	8°55.1
Peacock	53°12.5	-56°40.1
Deneb	49°28.5	45°20.8
Enif	33°43.1	9°57.7
Alnair	27°38.6	-46°51.8
Fomalhaut	15°19.6	-29°31.1
Scheat	13°49.5	28°11.0
Markab	13°34.3	15°18.4

2019/6/3	**SHA**	**Mer.pass**
Venus	309°28.2	10:38
Mars	257°23.2	14:05
Jupiter	100°20.8	00:34
Saturn	68°49.1	02:40

2019/6/4	**SHA**	**Mer.pass**
Venus	308°14.5	10:39
Mars	256°41.2	14:04
Jupiter	100°28.9	00:29
Saturn	68°52.3	02:35

2019/6/5	**SHA**	**Mer.pass**
Venus	307°00.6	10:40
Mars	255°59.2	14:03
Jupiter	100°37.1	00:25
Saturn	68°55.6	02:31

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h Sun Moon

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°29.3	22°14.8	185°31.7	8.7	18°05.2	7.8	57.8
1	195°29.2	22°15.1	199°59.3	8.6	18°13.0	7.8	57.9
2	210°29.1	22°15.4	214°26.9	8.5	18°20.7	7.7	57.9
3	225°29.0	22°15.8	228°54.4	8.5	18°28.3	7.6	57.9
4	240°28.9	22°16.1	243°21.9	8.4	18°35.8	7.5	57.9
5	255°28.8	22°16.4	257°49.2	8.3	18°43.2	7.4	58.0
6	270°28.7	22°16.7	272°16.5	8.2	18°50.5	7.2	58.0
7	285°28.6	22°17.0	286°43.6	8.1	18°57.7	7.1	58.0
8	300°28.5	22°17.3	301°10.7	8.1	19°04.8	7.0	58.0
9	315°28.4	22°17.6	315°37.7	8.0	19°11.8	6.9	58.1
10	330°28.2	22°17.9	330°04.7	7.9	19°18.6	6.8	58.1
11	345°28.1	22°18.2	344°31.5	7.8	19°25.4	6.7	58.1
12	0°28.0	22°18.5	358°58.3	7.7	19°32.1	6.6	58.1
13	15°27.9	22°18.9	13°25.0	7.7	19°38.6	6.5	58.2
14	30°27.8	22°19.2	27°51.6	7.6	19°45.0	6.4	58.2
15	45°27.7	22°19.5	42°18.1	7.5	19°51.4	6.3	58.2
16	60°27.6	22°19.8	56°44.6	7.4	19°57.6	6.1	58.2
17	75°27.5	22°20.1	71°11.0	7.3	20°03.7	6.0	58.3
18	90°27.4	22°20.4	85°37.3	7.3	20°09.6	5.9	58.3
19	105°27.3	22°20.7	100°03.5	7.2	20°15.5	5.8	58.3
20	120°27.2	22°21.0	114°29.7	7.1	20°21.2	5.7	58.3
21	135°27.1	22°21.3	128°55.8	7.0	20°26.8	5.6	58.3
22	150°27.0	22°21.6	143°21.8	7.0	20°32.3	5.4	58.4
23	165°26.9	22°21.9	157°47.7	6.9	20°37.7	5.3	58.4
	SD.=15.8	d=0.3			S.D.=15.8		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°26.8	22°22.2	172°13.6	6.8	20°42.9	5.2	58.4
1	195°26.7	22°22.5	186°39.4	6.8	20°48.1	5.1	58.4
2	210°26.6	22°22.8	201°05.1	6.7	20°53.1	4.9	58.5
3	225°26.5	22°23.1	215°30.8	6.6	20°57.9	4.8	58.5
4	240°26.4	22°23.4	229°56.4	6.6	21°02.7	4.7	58.5
5	255°26.3	22°23.7	244°21.9	6.5	21°07.3	4.5	58.5
6	270°26.1	22°24.0	258°47.4	6.4	21°11.8	4.4	58.5
7	285°26.0	22°24.3	273°12.8	6.4	21°16.1	4.3	58.6
8	300°25.9	22°24.6	287°38.1	6.3	21°20.3	4.2	58.6
9	315°25.8	22°24.9	302°03.4	6.3	21°24.4	4.0	58.6
10	330°25.7	22°25.1	316°28.6	6.2	21°28.4	3.9	58.6
11	345°25.6	22°25.4	330°53.8	6.1	21°32.2	3.7	58.7
12	0°25.5	22°25.7	345°18.9	6.1	21°35.9	3.6	58.7
13	15°25.4	22°26.0	359°44.0	6.0	21°39.4	3.5	58.7
14	30°25.3	22°26.3	14°09.0	6.0	21°42.8	3.3	58.7
15	45°25.2	22°26.6	28°33.9	5.9	21°46.1	3.2	58.7
16	60°25.1	22°26.9	42°58.8	5.9	21°49.2	3.1	58.8
17	75°25.0	22°27.2	57°23.7	5.8	21°52.2	2.9	58.8
18	90°24.9	22°27.5	71°48.5	5.8	21°55.1	2.8	58.8
19	105°24.7	22°27.7	86°13.2	5.7	21°57.8	2.6	58.8
20	120°24.6	22°28.0	100°37.9	5.7	22°00.3	2.5	58.8
21	135°24.5	22°28.3	115°02.6	5.6	22°02.8	2.4	58.8
22	150°24.4	22°28.6	129°27.2	5.6	22°05.0	2.2	58.9
23	165°24.3	22°28.9	143°51.8	5.6	22°07.2	2.1	58.9
	SD.=15.8	d=0.3			S.D.=15.9		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°24.2	22°29.2	158°16.3	5.5	22°09.2	1.9	58.9
1	195°24.1	22°29.5	172°40.8	5.5	22°11.0	1.8	58.9
2	210°24.0	22°29.7	187°05.3	5.4	22°12.7	1.6	58.9
3	225°23.9	22°30.0	201°29.7	5.4	22°14.3	1.5	58.9
4	240°23.8	22°30.3	215°54.1	5.4	22°15.7	1.3	59.0
5	255°23.6	22°30.6	230°18.5	5.4	22°16.9	1.2	59.0
6	270°23.5	22°30.9	244°42.8	5.3	22°18.1	1.0	59.0
7	285°23.4	22°31.1	259°07.1	5.3	22°19.0	0.9	59.0
8	300°23.3	22°31.4	273°31.4	5.3	22°19.8	0.7	59.0
9	315°23.2	22°31.7	287°55.7	5.2	22°20.5	0.6	59.0
10	330°23.1	22°32.0	302°19.9	5.2	22°21.0	0.4	59.1
11	345°23.0	22°32.2	316°44.1	5.2	22°21.4	0.3	59.1
12	0°22.9	22°32.5	331°08.3	5.2	22°21.6	0.1	59.1
13	15°22.8	22°32.8	345°32.5	5.2	22°21.7	-0.0	59.1
14	30°22.7	22°33.1	359°56.6	5.2	22°21.6	-0.2	59.1
15	45°22.5	22°33.3	14°20.8	5.1	22°21.4	-0.3	59.1
16	60°22.4	22°33.6	28°44.9	5.1	22°21.0	-0.5	59.1
17	75°22.3	22°33.9	43°09.0	5.1	22°20.5	-0.6	59.2
18	90°22.2	22°34.2	57°33.2	5.1	22°19.8	-0.8	59.2
19	105°22.1	22°34.4	71°57.3	5.1	22°19.0	-0.9	59.2
20	120°22.0	22°34.7	86°21.4	5.1	22°18.0	-1.1	59.2
21	135°21.9	22°35.0	100°45.5	5.1	22°16.9	-1.2	59.2
22	150°21.8	22°35.2	115°09.6	5.1	22°15.6	-1.4	59.2
23	165°21.6	22°35.5	129°33.7	5.1	22°14.2	-1.5	59.2
	SD.=15.8	d=0.3			S.D.=16.1		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:01	23:00	–:–	–:–
64	–:–	–:–	01:52	22:07	–:–	–:–
62	–:–	–:–	02:23	21:35	–:–	–:–
60	–:–	01:19	02:46	21:12	22:41	–:–
58	–:–	01:55	03:04	20:53	22:03	–:–
56	–:–	02:21	03:19	20:38	21:37	–:–
54	01:12	02:41	03:33	20:25	21:17	22:47
52	01:46	02:57	03:44	20:13	21:00	22:12
50	02:09	03:11	03:54	20:03	20:46	21:48
45	02:51	03:39	04:15	19:42	20:18	21:07
40	03:19	04:00	04:32	19:25	19:57	20:38
35	03:41	04:17	04:47	19:10	19:40	20:16
30	03:59	04:32	04:59	18:58	19:25	19:58
20	04:27	04:56	05:20	18:37	19:01	19:30
10	04:48	05:15	05:38	18:19	18:42	19:08
0	05:06	05:32	05:55	18:02	18:24	18:50
-10	05:22	05:49	06:11	17:45	18:08	18:34
-20	05:38	06:05	06:29	17:28	17:51	18:19
-30	05:53	06:23	06:49	17:07	17:34	18:03
-35	06:01	06:33	07:01	16:56	17:24	17:55
-40	06:10	06:44	07:14	16:42	17:12	17:46
-45	06:20	06:57	07:30	16:26	16:60	17:36
-50	06:31	07:12	07:50	16:07	16:45	17:26
-52	06:36	07:19	07:59	15:57	16:38	17:21
-54	06:41	07:26	08:09	15:47	16:30	17:15
-56	06:47	07:35	08:21	15:35	16:21	17:10
-58	06:53	07:44	08:35	15:22	16:12	17:04
-60	06:60	07:55	08:51	15:06	16:01	16:57

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	–:–	–:–	–:–	–:–
70	01:24	–:–	–:–	–:–	–:–	–:–
68	02:04	01:57	–:–	22:59	–:–	–:–
66	02:32	02:43	03:11	22:14	23:47	–:–
64	02:53	03:13	03:50	21:44	23:08	–:–
62	03:10	03:36	04:18	21:22	22:41	23:42
60	03:25	03:55	04:39	21:04	22:20	23:21
58	03:37	04:10	04:56	20:49	22:03	23:04
56	03:48	04:23	05:11	20:36	21:48	22:49
54	03:57	04:35	05:24	20:25	21:36	22:37
52	04:06	04:45	05:35	20:15	21:25	22:25
50	04:13	04:54	05:45	20:06	21:15	22:16
45	04:30	05:13	06:05	19:48	20:54	21:55
40	04:43	05:29	06:22	19:33	20:37	21:38
35	04:54	05:42	06:37	19:20	20:23	21:24
30	05:04	05:54	06:49	19:09	20:11	21:11
20	05:22	06:14	07:10	18:50	19:50	20:50
10	05:37	06:31	07:29	18:33	19:32	20:32
0	05:51	06:47	07:46	18:18	19:15	20:15
-10	06:05	07:04	08:03	18:02	18:58	19:57
-20	06:21	07:21	08:22	17:46	18:40	19:39
-30	06:39	07:42	08:43	17:27	18:19	19:17
-35	06:49	07:53	08:56	17:16	18:07	19:05
-40	07:01	08:07	09:10	17:03	17:53	18:50
-45	07:15	08:23	09:27	16:48	17:36	18:33
-50	07:32	08:44	09:49	16:30	17:16	18:12
-52	07:40	08:53	09:59	16:22	17:06	18:02
-54	07:50	09:04	10:10	16:12	16:55	17:50
-56	07:60	09:16	10:23	16:02	16:42	17:37
-58	08:12	09:30	10:38	15:49	16:28	17:22
-60	08:25	09:47	10:56	15:35	16:11	17:04

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	01:57	01:52	11:58	12:04	00:32	0(0%)
4	01:47	01:42	11:58	13:01	00:32	1(1%)
5	01:37	01:32	11:58	14:00	01:30	2(5%)

June 06, 07 ,08 (Thu., Fri., Sat.)

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	254°07.0	199°53.4	18°13.1	149°24.4	23°55.0	354°52.3	-22°28.4	323°06.0	-21°40.0
1	269°09.5	214°52.8	18°13.9	164°25.1	23°54.9	9°55.1	-22°28.4	338°08.6	-21°40.0
2	284°12.0	229°52.1	18°14.7	179°25.8	23°54.7	24°57.9	-22°28.4	353°11.2	-21°40.0
3	299°14.4	244°51.5	18°15.4	194°26.6	23°54.5	40°00.7	-22°28.4	8°13.8	-21°40.1
4	314°16.9	259°50.9	18°16.2	209°27.3	23°54.4	55°03.5	-22°28.4	23°16.4	-21°40.1
5	329°19.4	274°50.2	18°17.0	224°28.0	23°54.2	70°06.3	-22°28.3	38°19.0	-21°40.1
6	344°21.8	289°49.6	18°17.8	239°28.7	23°54.1	85°09.1	-22°28.3	53°21.7	-21°40.1
7	359°24.3	304°49.0	18°18.6	254°29.4	23°53.9	100°11.9	-22°28.3	68°24.3	-21°40.1
8	14°26.7	319°48.3	18°19.3	269°30.2	23°53.7	115°14.7	-22°28.3	83°26.9	-21°40.2
9	29°29.2	334°47.7	18°20.1	284°30.9	23°53.6	130°17.5	-22°28.3	98°29.5	-21°40.2
10	44°31.7	349°47.0	18°20.9	299°31.6	23°53.4	145°20.4	-22°28.2	113°32.1	-21°40.2
11	59°34.1	4°46.4	18°21.7	314°32.3	23°53.2	160°23.2	-22°28.2	128°34.7	-21°40.2
12	74°36.6	19°45.8	18°22.4	329°33.1	23°53.1	175°26.0	-22°28.2	143°37.3	-21°40.3
13	89°39.1	34°45.1	18°23.2	344°33.8	23°52.9	190°28.8	-22°28.2	158°39.9	-21°40.3
14	104°41.5	49°44.5	18°24.0	359°34.5	23°52.8	205°31.6	-22°28.2	173°42.5	-21°40.3
15	119°44.0	64°43.8	18°24.8	14°35.2	23°52.6	220°34.4	-22°28.1	188°45.1	-21°40.3
16	134°46.5	79°43.2	18°25.5	29°35.9	23°52.4	235°37.2	-22°28.1	203°47.7	-21°40.3
17	149°48.9	94°42.6	18°26.3	44°36.7	23°52.3	250°40.0	-22°28.1	218°50.3	-21°40.4
18	164°51.4	109°41.9	18°27.1	59°37.4	23°52.1	265°42.8	-22°28.1	233°52.9	-21°40.4
19	179°53.9	124°41.3	18°27.9	74°38.1	23°51.9	280°45.6	-22°28.1	248°55.6	-21°40.4
20	194°56.3	139°40.6	18°28.6	89°38.8	23°51.8	295°48.4	-22°28.1	263°58.2	-21°40.4
21	209°58.8	154°40.0	18°29.4	104°39.6	23°51.6	310°51.2	-22°28.0	279°00.8	-21°40.4
22	225°01.2	169°39.3	18°30.2	119°40.3	23°51.4	325°54.0	-22°28.0	294°03.4	-21°40.5
23	240°03.7	184°38.7	18°30.9	134°41.0	23°51.3	340°56.8	-22°28.0	309°06.0	-21°40.5
Mer.pass.:7:02:		v-0.6 d0.8 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	255°06.2	199°38.1	18°31.7	149°41.7	23°51.1	355°59.6	-22°28.0	324°08.6	-21°40.5
1	270°08.6	214°37.4	18°32.5	164°42.4	23°51.0	11°02.5	-22°28.0	339°11.2	-21°40.5
2	285°11.1	229°36.8	18°33.2	179°43.2	23°50.8	26°05.3	-22°27.9	354°13.8	-21°40.6
3	300°13.6	244°36.1	18°34.0	194°43.9	23°50.6	41°08.1	-22°27.9	9°16.4	-21°40.6
4	315°16.0	259°35.5	18°34.7	209°44.6	23°50.5	56°10.9	-22°27.9	24°19.0	-21°40.6
5	330°18.5	274°34.8	18°35.5	224°45.3	23°50.3	71°13.7	-22°27.9	39°21.7	-21°40.6
6	345°21.0	289°34.2	18°36.3	239°46.1	23°50.1	86°16.5	-22°27.9	54°24.3	-21°40.6
7	0°23.4	304°33.5	18°37.0	254°46.8	23°49.9	101°19.3	-22°27.8	69°26.9	-21°40.7
8	15°25.9	319°32.9	18°37.8	269°47.5	23°49.8	116°22.1	-22°27.8	84°29.5	-21°40.7
9	30°28.4	334°32.2	18°38.5	284°48.2	23°49.6	131°24.9	-22°27.8	99°32.1	-21°40.7
10	45°30.8	349°31.6	18°39.3	299°49.0	23°49.4	146°27.7	-22°27.8	114°34.7	-21°40.7
11	60°33.3	4°30.9	18°40.1	314°49.7	23°49.3	161°30.5	-22°27.8	129°37.3	-21°40.8
12	75°35.7	19°30.3	18°40.8	329°50.4	23°49.1	176°33.3	-22°27.7	144°39.9	-21°40.8
13	90°38.2	34°29.6	18°41.6	344°51.1	23°48.9	191°36.1	-22°27.7	159°42.5	-21°40.8
14	105°40.7	49°29.0	18°42.3	359°51.8	23°48.8	206°38.9	-22°27.7	174°45.1	-21°40.8
15	120°43.1	64°28.3	18°43.1	14°52.6	23°48.6	221°41.8	-22°27.7	189°47.8	-21°40.8
16	135°45.6	79°27.7	18°43.8	29°53.3	23°48.4	236°44.6	-22°27.7	204°50.4	-21°40.9
17	150°48.1	94°27.0	18°44.6	44°54.0	23°48.2	251°47.4	-22°27.6	219°53.0	-21°40.9
18	165°50.5	109°26.4	18°45.3	59°54.7	23°48.1	266°50.2	-22°27.6	234°55.6	-21°40.9
19	180°53.0	124°25.7	18°46.1	74°55.5	23°47.9	281°53.0	-22°27.6	249°58.2	-21°40.9
20	195°55.5	139°25.1	18°46.8	89°56.2	23°47.7	296°55.8	-22°27.6	265°00.8	-21°41.0
21	210°57.9	154°24.4	18°47.6	104°56.9	23°47.6	311°58.6	-22°27.6	280°03.4	-21°41.0
22	226°00.4	169°23.7	18°48.3	119°57.6	23°47.4	327°01.4	-22°27.6	295°06.0	-21°41.0
23	241°02.9	184°23.1	18°49.1	134°58.4	23°47.2	342°04.2	-22°27.5	310°08.7	-21°41.0
Mer.pass.:6:58:		v-0.6 d0.8 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	256°05.3	199°22.4	18°49.8	149°59.1	23°47.0	357°07.0	-22°27.5	325°11.3	-21°41.1
1	271°07.8	214°21.8	18°50.6	164°59.8	23°46.9	12°09.8	-22°27.5	340°13.9	-21°41.1
2	286°10.2	229°21.1	18°51.3	180°00.5	23°46.7	27°12.6	-22°27.5	355°16.5	-21°41.1
3	301°12.7	244°20.5	18°52.1	195°01.3	23°46.5	42°15.4	-22°27.5	10°19.1	-21°41.1
4	316°15.2	259°19.8	18°52.8	210°02.0	23°46.3	57°18.3	-22°27.4	25°21.7	-21°41.1
5	331°17.6	274°19.1	18°53.5	225°02.7	23°46.2	72°21.1	-22°27.4	40°24.3	-21°41.2
6	346°20.1	289°18.5	18°54.3	240°03.4	23°46.0	87°23.9	-22°27.4	55°26.9	-21°41.2
7	1°22.6	304°17.8	18°55.0	255°04.2	23°45.8	102°26.7	-22°27.4	70°29.6	-21°41.2
8	16°25.0	319°17.2	18°55.8	270°04.9	23°45.6	117°29.5	-22°27.4	85°32.2	-21°41.2
9	31°27.5	334°16.5	18°56.5	285°05.6	23°45.5	132°32.3	-22°27.3	100°34.8	-21°41.3
10	46°30.0	349°15.8	18°57.2	300°06.4	23°45.3	147°35.1	-22°27.3	115°37.4	-21°41.3
11	61°32.4	4°15.2	18°58.0	315°07.1	23°45.1	162°37.9	-22°27.3	130°40.0	-21°41.3
12	76°34.9	19°14.5	18°58.7	330°07.8	23°44.9	177°40.7	-22°27.3	145°42.6	-21°41.3
13	91°37.3	34°13.9	18°59.4	345°08.5	23°44.8	192°43.5	-22°27.3	160°45.2	-21°41.3
14	106°39.8	49°13.2	19°00.2	0°09.3	23°44.6	207°46.3	-22°27.2	175°47.9	-21°41.4
15	121°42.3	64°12.5	19°00.9	15°10.0	23°44.4	222°49.1	-22°27.2	190°50.5	-21°41.4
16	136°44.7	79°11.9	19°01.6	30°10.7	23°44.2	237°52.0	-22°27.2	205°53.1	-21°41.4
17	151°47.2	94°11.2	19°02.4	45°11.4	23°44.0	252°54.8	-22°27.2	220°55.7	-21°41.4
18	166°49.7	109°10.5	19°03.1	60°12.2	23°43.9	267°57.6	-22°27.2	235°58.3	-21°41.5
19	181°52.1	124°09.9	19°03.8	75°12.9	23°43.7	283°00.4	-22°27.1	251°00.9	-21°41.5
20	196°54.6	139°09.2	19°04.6	90°13.6	23°43.5	298°03.2	-22°27.1	266°03.5	-21°41.5
21	211°57.1	154°08.5	19°05.3	105°14.3	23°43.3	313°06.0	-22°27.1	281°06.2	-21°41.5
22	226°59.5	169°07.9	19°06.0	120°15.1	23°43.1	328°08.8	-22°27.1	296°08.8	-21°41.5
23	242°02.0	184°07.2	19°06.7	135°15.8	23°43.0	343°11.6	-22°27.1	311°11.4	-21°41.6
Mer.pass.:6:54:		v-0.7 d0.7 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Stars

Star	SHA	Dec
Alpheratz	357°39.4	29°11.6
Ankaa	353°11.8	-42°12.0
Schedar	349°36.1	56°38.2
Diphda	348°51.9	-17°52.9
Achernar	335°24.1	-57°08.2
Hamal	327°56.5	23°33.0
Polaris	316°24.2	89°20.4
Akamar	315°15.6	-40°13.7
Menkar	314°11.1	4°09.7
Mirfak	308°35.0	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°28.0	6°21.8
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.6
Sirius	258°30.4	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.8	-59°34.6
Suhail	222°49.7	-43°30.9
Miaplacidus	221°39.3	-69°48.1
Alphard	217°52.2	-8°44.7
Regulus	207°39.2	11°52.4
Dubhe	193°46.7	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.5	-63°12.6
Gacrux	171°56.1	-57°13.5
Alioth	166°16.9	55°51.6
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.3
Hadar	148°41.6	-60°28.0
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.6	-60°54.9
Zubenelg.	137°00.6	-16°07.3
Kochab	137°19.1	74°04.9
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°16.0	-37°06.9
Rasalhague	96°02.4	12°32.9
Etamin	90°43.7	51°29.2
Kaus Aust.	83°38.0	-34°22.3
Vega	80°35.8	38°48.1
Nunki	75°53.0	-26°16.2
Altair	62°04.1	8°55.1
Peacock	53°12.5	-56°40.1
Deneb	49°28.4	45°20.8
Enif	33°43.0	9°57.7
Alnair	27°38.5	-46°51.8
Fomalhaut	15°19.6	-29°31.1
Scheat	13°49.5	28°11.0
Markab	13°34.3	15°18.4

2019/6/6	SHA	Mer.pass
Venus	305°46.4	10:41
Mars	255°17.4	14:02
Jupiter	100°45.3	00:20
Saturn	68°59.0	02:27

2019/6/7	SHA	Mer.pass
Venus	304°31.9	10:42
Mars	254°35.5	14:01
Jupiter	100°53.5	00:16
Saturn	69°02.4	02:23

2019/6/8	SHA	Mer.pass
Venus	303°17.1	10:43
Mars	253°53.8	13:59
Jupiter	101°01.7	00:11
Saturn	69°06.0	02:19

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°21.5	22°35.8	143°57.7	5.1	22°12.6	-1.7	59.2
1	195°21.4	22°36.0	158°21.8	5.1	22°10.9	-1.8	59.3
2	210°21.3	22°36.3	172°46.0	5.1	22°09.0	-2.0	59.3
3	225°21.2	22°36.6	187°10.1	5.1	22°07.0	-2.1	59.3
4	240°21.1	22°36.8	201°34.2	5.1	22°04.8	-2.3	59.3
5	255°21.0	22°37.1	215°58.3	5.1	22°02.4	-2.4	59.3
6	270°20.9	22°37.3	230°22.4	5.1	21°60.0	-2.6	59.3
7	285°20.7	22°37.6	244°46.6	5.2	21°57.3	-2.7	59.3
8	300°20.6	22°37.9	259°10.8	5.2	21°54.6	-2.8	59.3
9	315°20.5	22°38.1	273°34.9	5.2	21°51.6	-3.0	59.3
10	330°20.4	22°38.4	287°59.1	5.2	21°48.6	-3.1	59.3
11	345°20.3	22°38.7	302°23.4	5.2	21°45.4	-3.3	59.4
12	0°20.2	22°38.9	316°47.6	5.3	21°42.0	-3.4	59.4
13	15°20.1	22°39.2	331°11.9	5.3	21°38.5	-3.6	59.4
14	30°19.9	22°39.4	345°36.2	5.3	21°34.8	-3.7	59.4
15	45°19.8	22°39.7	0°00.5	5.3	21°31.0	-3.9	59.4
16	60°19.7	22°39.9	14°24.8	5.4	21°27.1	-4.0	59.4
17	75°19.6	22°40.2	28°49.2	5.4	21°23.0	-4.2	59.4
18	90°19.5	22°40.4	43°13.6	5.4	21°18.7	-4.3	59.4
19	105°19.4	22°40.7	57°38.0	5.4	21°14.4	-4.5	59.4
20	120°19.3	22°41.0	72°02.5	5.5	21°09.8	-4.6	59.4
21	135°19.1	22°41.2	86°27.0	5.5	21°05.2	-4.7	59.4
22	150°19.0	22°41.5	100°51.5	5.5	21°00.4	-4.9	59.4
23	165°18.9	22°41.7	115°16.1	5.6	20°55.4	-5.0	59.4
	SD.=15.8	d=0.3			S.D.=16.2		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°18.8	22°42.0	129°40.7	5.6	20°50.3	-5.2	59.4
1	195°18.7	22°42.2	144°05.3	5.7	20°45.1	-5.3	59.4
2	210°18.6	22°42.5	158°30.0	5.7	20°39.8	-5.4	59.5
3	225°18.4	22°42.7	172°54.7	5.7	20°34.3	-5.6	59.5
4	240°18.3	22°43.0	187°19.5	5.8	20°28.6	-5.7	59.5
5	255°18.2	22°43.2	201°44.3	5.8	20°22.8	-5.8	59.5
6	270°18.1	22°43.4	216°09.1	5.9	20°16.9	-6.0	59.5
7	285°18.0	22°43.7	230°34.1	5.9	20°10.9	-6.1	59.5
8	300°17.9	22°43.9	244°59.0	6.0	20°04.7	-6.2	59.5
9	315°17.7	22°44.2	259°24.0	6.0	19°58.4	-6.4	59.5
10	330°17.6	22°44.4	273°49.0	6.1	19°52.0	-6.5	59.5
11	345°17.5	22°44.7	288°14.1	6.1	19°45.4	-6.6	59.5
12	0°17.4	22°44.9	302°39.3	6.2	19°38.7	-6.8	59.5
13	15°17.3	22°45.1	317°04.5	6.2	19°31.9	-6.9	59.5
14	30°17.2	22°45.4	331°29.7	6.3	19°25.0	-7.0	59.5
15	45°17.0	22°45.6	345°55.1	6.3	19°17.9	-7.1	59.5
16	60°16.9	22°45.9	0°20.4	6.4	19°10.7	-7.3	59.5
17	75°16.8	22°46.1	14°45.8	6.4	19°03.4	-7.4	59.5
18	90°16.7	22°46.3	29°11.3	6.5	18°55.9	-7.5	59.5
19	105°16.6	22°46.6	43°36.8	6.6	18°48.3	-7.6	59.5
20	120°16.5	22°46.8	58°02.4	6.6	18°40.7	-7.7	59.5
21	135°16.3	22°47.1	72°28.0	6.7	18°32.8	-7.9	59.5
22	150°16.2	22°47.3	86°53.7	6.7	18°24.9	-8.0	59.5
23	165°16.1	22°47.5	101°19.5	6.8	18°16.9	-8.1	59.5
	SD.=15.8	d=0.2			S.D.=16.2		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°16.0	22°47.8	115°45.3	6.8	18°08.7	-8.2	59.5
1	195°15.9	22°48.0	130°11.2	6.9	18°00.4	-8.3	59.5
2	210°15.7	22°48.2	144°37.1	7.0	17°52.0	-8.4	59.5
3	225°15.6	22°48.5	159°03.1	7.0	17°43.5	-8.6	59.5
4	240°15.5	22°48.7	173°29.2	7.1	17°34.9	-8.7	59.5
5	255°15.4	22°48.9	187°55.3	7.2	17°26.2	-8.8	59.5
6	270°15.3	22°49.1	202°21.5	7.2	17°17.4	-8.9	59.5
7	285°15.1	22°49.4	216°47.7	7.3	17°08.4	-9.0	59.5
8	300°15.0	22°49.6	231°14.1	7.3	16°59.4	-9.1	59.5
9	315°14.9	22°49.8	245°40.4	7.4	16°50.3	-9.2	59.5
10	330°14.8	22°50.1	260°06.9	7.5	16°41.0	-9.3	59.5
11	345°14.7	22°50.3	274°33.4	7.5	16°31.6	-9.4	59.5
12	0°14.5	22°50.5	288°59.9	7.6	16°22.2	-9.5	59.5
13	15°14.4	22°50.7	303°26.5	7.7	16°12.6	-9.6	59.5
14	30°14.3	22°51.0	317°53.2	7.7	16°03.0	-9.7	59.5
15	45°14.2	22°51.2	332°20.0	7.8	15°53.2	-9.8	59.5
16	60°14.1	22°51.4	346°46.8	7.8	15°43.4	-9.9	59.5
17	75°13.9	22°51.6	1°13.6	7.9	15°33.4	-10.0	59.5
18	90°13.8	22°51.8	15°40.6	8.0	15°23.4	-10.1	59.5
19	105°13.7	22°52.1	30°07.6	8.0	15°13.3	-10.2	59.5
20	120°13.6	22°52.3	44°34.7	8.1	15°03.1	-10.3	59.5
21	135°13.5	22°52.5	59°01.8	8.2	14°52.7	-10.4	59.5
22	150°13.3	22°52.7	73°29.0	8.2	14°42.4	-10.4	59.5
23	165°13.2	22°52.9	87°56.2	8.3	14°31.9	-10.5	59.4
	SD.=15.8	d=0.2			S.D.=16.2		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:47	23:16	–:–	–:–
64	–:–	–:–	01:45	22:14	–:–	–:–
62	–:–	–:–	02:18	21:41	–:–	–:–
60	–:–	01:11	02:42	21:16	22:49	–:–
58	–:–	01:51	03:01	20:57	22:09	–:–
56	–:–	02:17	03:17	20:41	21:41	–:–
54	01:04	02:38	03:31	20:28	21:21	22:55
52	01:41	02:55	03:42	20:16	21:04	22:18
50	02:06	03:09	03:53	20:06	20:49	21:52
45	02:49	03:37	04:14	19:44	20:21	21:09
40	03:18	03:59	04:31	19:26	19:59	20:40
35	03:40	04:17	04:46	19:12	19:41	20:18
30	03:58	04:31	04:59	18:59	19:27	19:60
20	04:26	04:55	05:20	18:38	19:02	19:31
10	04:48	05:15	05:38	18:20	18:42	19:09
0	05:07	05:33	05:55	18:02	18:25	18:51
-10	05:23	05:49	06:12	17:46	18:08	18:35
-20	05:39	06:06	06:30	17:28	17:52	18:19
-30	05:55	06:24	06:51	17:07	17:33	18:03
-35	06:03	06:34	07:02	16:55	17:23	17:55
-40	06:12	06:46	07:16	16:41	17:12	17:46
-45	06:22	06:59	07:32	16:25	16:59	17:36
-50	06:33	07:14	07:52	16:05	16:43	17:24
-52	06:38	07:21	08:02	15:56	16:36	17:19
-54	06:43	07:29	08:12	15:45	16:28	17:14
-56	06:49	07:38	08:24	15:33	16:20	17:08
-58	06:56	07:48	08:38	15:19	16:10	17:02
-60	07:03	07:59	08:55	15:03	15:59	16:55

	Moonrise			Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	–:–	05:41	–:–	–:–	03:29
70	–:–	–:–	06:43	–:–	–:–	02:26
68	02:41	05:11	07:18	02:22	01:57	01:50
66	04:16	05:53	07:43	00:48	01:14	01:25
64	04:54	06:22	08:02	00:09	00:45	01:05
62	05:21	06:44	08:18	–:–	00:23	00:48
60	05:42	07:01	08:31	–:–	00:05	00:34
58	05:59	07:16	08:42	23:50	–:–	00:23
56	06:13	07:29	08:51	23:37	–:–	00:12
54	06:26	07:39	09:00	23:25	–:–	00:03
52	06:37	07:49	09:08	23:15	23:55	–:–
50	06:47	07:58	09:15	23:06	23:48	–:–
45	07:07	08:16	09:29	22:47	23:32	–:–
40	07:24	08:31	09:41	22:32	23:19	23:59
35	07:38	08:44	09:52	22:19	23:08	23:51
30	07:50	08:54	10:00	22:07	22:58	23:43
20	08:11	09:13	10:16	21:48	22:41	23:30
10	08:29	09:30	10:29	21:30	22:26	23:19
0	08:46	09:45	10:42	21:14	22:12	23:08
-10	09:03	10:00	10:54	20:58	21:58	22:57
-20	09:21	10:16	11:08	20:40	21:43	22:45
-30	09:42	10:35	11:23	20:20	21:26	22:32
-35	09:54	10:46	11:31	20:08	21:16	22:24
-40	10:08	10:58	11:41	19:55	21:04	22:15
-45	10:24	11:13	11:53	19:39	20:50	22:05
-50	10:45	11:30	12:07	19:19	20:33	21:52
-52	10:54	11:39	12:14	19:09	20:25	21:46
-54	11:05	11:48	12:21	18:59	20:17	21:39
-56	11:18	11:59	12:29	18:47	20:07	21:32
-58	11:32	12:10	12:38	18:33	19:55	21:23
-60	11:49	12:24	12:48	18:16	19:42	21:14

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	01:26	01:21	11:58	14:59	02:30	3(12%)
7	01:15	01:10	11:58	15:58	03:29	4(20%)
8	01:04	00:58	11:59	16:54	04:27	5(30%)

June 09, 10 ,11 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	257°04.5	199°06.5	19°07.5	150°16.5	23°42.8	358°14.4	-22°27.0	326°14.0	-21°41.6
1	272°06.9	214°05.9	19°08.2	165°17.3	23°42.6	13°17.2	-22°27.0	341°16.6	-21°41.6
2	287°09.4	229°05.2	19°08.9	180°18.0	23°42.4	28°20.0	-22°27.0	356°19.2	-21°41.6
3	302°11.8	244°04.5	19°09.6	195°18.7	23°42.2	43°22.8	-22°27.0	11°21.8	-21°41.7
4	317°14.3	259°03.9	19°10.4	210°19.4	23°42.1	58°25.7	-22°27.0	26°24.5	-21°41.7
5	332°16.8	274°03.2	19°11.1	225°20.2	23°41.9	73°28.5	-22°27.0	41°27.1	-21°41.7
6	347°19.2	289°02.5	19°11.8	240°20.9	23°41.7	88°31.3	-22°26.9	56°29.7	-21°41.7
7	2°21.7	304°01.9	19°12.5	255°21.6	23°41.5	103°34.1	-22°26.9	71°32.3	-21°41.8
8	17°24.2	319°01.2	19°13.2	270°22.4	23°41.3	118°36.9	-22°26.9	86°34.9	-21°41.8
9	32°26.6	334°00.5	19°13.9	285°23.1	23°41.1	133°39.7	-22°26.9	101°37.5	-21°41.8
10	47°29.1	348°59.8	19°14.7	300°23.8	23°41.0	148°42.5	-22°26.9	116°40.2	-21°41.8
11	62°31.6	3°59.2	19°15.4	315°24.5	23°40.8	163°45.3	-22°26.8	131°42.8	-21°41.8
12	77°34.0	18°58.5	19°16.1	330°25.3	23°40.6	178°48.1	-22°26.8	146°45.4	-21°41.9
13	92°36.5	33°57.8	19°16.8	345°26.0	23°40.4	193°50.9	-22°26.8	161°48.0	-21°41.9
14	107°39.0	48°57.1	19°17.5	0°26.7	23°40.2	208°53.7	-22°26.8	176°50.6	-21°41.9
15	122°41.4	63°56.5	19°18.2	15°27.5	23°40.0	223°56.5	-22°26.8	191°53.2	-21°41.9
16	137°43.9	78°55.8	19°18.9	30°28.2	23°39.8	238°59.4	-22°26.7	206°55.9	-21°42.0
17	152°46.3	93°55.1	19°19.7	45°28.9	23°39.7	254°02.2	-22°26.7	221°58.5	-21°42.0
18	167°48.8	108°54.4	19°20.4	60°29.6	23°39.5	269°05.0	-22°26.7	237°01.1	-21°42.0
19	182°51.3	123°53.8	19°21.1	75°30.4	23°39.3	284°07.8	-22°26.7	252°03.7	-21°42.0
20	197°53.7	138°53.1	19°21.8	90°31.1	23°39.1	299°10.6	-22°26.7	267°06.3	-21°42.1
21	212°56.2	153°52.4	19°22.5	105°31.8	23°38.9	314°13.4	-22°26.6	282°08.9	-21°42.1
22	227°58.7	168°51.7	19°23.2	120°32.6	23°38.7	329°16.2	-22°26.6	297°11.6	-21°42.1
23	243°01.1	183°51.1	19°23.9	135°33.3	23°38.5	344°19.0	-22°26.6	312°14.2	-21°42.1
Mer.pass.:6:50:		v-0.7 d0.7 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	258°03.6	198°50.4	19°24.6	150°34.0	23°38.4	359°21.8	-22°26.6	327°16.8	-21°42.1
1	273°06.1	213°49.7	19°25.3	165°34.8	23°38.2	14°24.6	-22°26.6	342°19.4	-21°42.2
2	288°08.5	228°49.0	19°26.0	180°35.5	23°38.0	29°27.4	-22°26.5	357°22.0	-21°42.2
3	303°11.0	243°48.3	19°26.7	195°36.2	23°37.8	44°30.2	-22°26.5	12°24.7	-21°42.2
4	318°13.4	258°47.7	19°27.4	210°37.0	23°37.6	59°33.1	-22°26.5	27°27.3	-21°42.2
5	333°15.9	273°47.0	19°28.1	225°37.7	23°37.4	74°35.9	-22°26.5	42°29.9	-21°42.3
6	348°18.4	288°46.3	19°28.8	240°38.4	23°37.2	89°38.7	-22°26.5	57°32.5	-21°42.3
7	3°20.8	303°45.6	19°29.5	255°39.1	23°37.0	104°41.5	-22°26.4	72°35.1	-21°42.3
8	18°23.3	318°44.9	19°30.2	270°39.9	23°36.8	119°44.3	-22°26.4	87°37.7	-21°42.3
9	33°25.8	333°44.2	19°30.9	285°40.6	23°36.6	134°47.1	-22°26.4	102°40.4	-21°42.4
10	48°28.2	348°43.6	19°31.6	300°41.3	23°36.5	149°49.9	-22°26.4	117°43.0	-21°42.4
11	63°30.7	3°42.9	19°32.3	315°42.1	23°36.3	164°52.7	-22°26.4	132°45.6	-21°42.4
12	78°33.2	18°42.2	19°33.0	330°42.8	23°36.1	179°55.5	-22°26.3	147°48.2	-21°42.4
13	93°35.6	33°41.5	19°33.7	345°43.5	23°35.9	194°58.3	-22°26.3	162°50.8	-21°42.4
14	108°38.1	48°40.8	19°34.4	0°44.3	23°35.7	210°01.1	-22°26.3	177°53.5	-21°42.5
15	123°40.6	63°40.1	19°35.1	15°45.0	23°35.5	225°04.0	-22°26.3	192°56.1	-21°42.5
16	138°43.0	78°39.4	19°35.8	30°45.7	23°35.3	240°06.8	-22°26.3	207°58.7	-21°42.5
17	153°45.5	93°38.8	19°36.4	45°46.5	23°35.1	255°09.6	-22°26.2	223°01.3	-21°42.5
18	168°47.9	108°38.1	19°37.1	60°47.2	23°34.9	270°12.4	-22°26.2	238°03.9	-21°42.6
19	183°50.4	123°37.4	19°37.8	75°47.9	23°34.7	285°15.2	-22°26.2	253°06.6	-21°42.6
20	198°52.9	138°36.7	19°38.5	90°48.7	23°34.5	300°18.0	-22°26.2	268°09.2	-21°42.6
21	213°55.3	153°36.0	19°39.2	105°49.4	23°34.3	315°20.8	-22°26.2	283°11.8	-21°42.6
22	228°57.8	168°35.3	19°39.9	120°50.1	23°34.1	330°23.6	-22°26.1	298°14.4	-21°42.7
23	244°00.3	183°34.6	19°40.6	135°50.9	23°33.9	345°26.4	-22°26.1	313°17.0	-21°42.7
Mer.pass.:6:46:		v-0.7 d0.7 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	259°02.7	198°33.9	19°41.2	150°51.6	23°33.7	0°29.2	-22°26.1	328°19.7	-21°42.7
1	274°05.2	213°33.3	19°41.9	165°52.3	23°33.5	15°32.0	-22°26.1	343°22.3	-21°42.7
2	289°07.7	228°32.6	19°42.6	180°53.1	23°33.3	30°34.8	-22°26.1	358°24.9	-21°42.8
3	304°10.1	243°31.9	19°43.3	195°53.8	23°33.1	45°37.7	-22°26.0	13°27.5	-21°42.8
4	319°12.6	258°31.2	19°44.0	210°54.5	23°33.0	60°40.5	-22°26.0	28°30.1	-21°42.8
5	334°15.1	273°30.5	19°44.6	225°55.3	23°32.8	75°43.3	-22°26.0	43°32.8	-21°42.8
6	349°17.5	288°29.8	19°45.3	240°56.0	23°32.6	90°46.1	-22°26.0	58°35.4	-21°42.8
7	4°20.0	303°29.1	19°46.0	255°56.7	23°32.4	105°48.9	-22°26.0	73°38.0	-21°42.9
8	19°22.4	318°28.4	19°46.7	270°57.5	23°32.2	120°51.7	-22°25.9	88°40.6	-21°42.9
9	34°24.9	333°27.7	19°47.3	285°58.2	23°32.0	135°54.5	-22°25.9	103°43.3	-21°42.9
10	49°27.4	348°27.0	19°48.0	300°58.9	23°31.8	150°57.3	-22°25.9	118°45.9	-21°42.9
11	64°29.8	3°26.3	19°48.7	315°59.7	23°31.6	166°00.1	-22°25.9	133°48.5	-21°43.0
12	79°32.3	18°25.6	19°49.4	331°00.4	23°31.4	181°02.9	-22°25.9	148°51.1	-21°43.0
13	94°34.8	33°24.9	19°50.0	346°01.1	23°31.2	196°05.7	-22°25.8	163°53.7	-21°43.0
14	109°37.2	48°24.2	19°50.7	1°01.9	23°31.0	211°08.5	-22°25.8	178°56.4	-21°43.0
15	124°39.7	63°23.5	19°51.4	16°02.6	23°30.8	226°11.4	-22°25.8	193°59.0	-21°43.1
16	139°42.2	78°22.8	19°52.0	31°03.3	23°30.6	241°14.2	-22°25.8	209°01.6	-21°43.1
17	154°44.6	93°22.1	19°52.7	46°04.1	23°30.4	256°17.0	-22°25.8	224°04.2	-21°43.1
18	169°47.1	108°21.4	19°53.4	61°04.8	23°30.2	271°19.8	-22°25.7	239°06.9	-21°43.1
19	184°49.5	123°20.7	19°54.0	76°05.5	23°30.0	286°22.6	-22°25.7	254°09.5	-21°43.2
20	199°52.0	138°20.0	19°54.7	91°06.3	23°29.8	301°25.4	-22°25.7	269°12.1	-21°43.2
21	214°54.5	153°19.3	19°55.4	106°07.0	23°29.6	316°28.2	-22°25.7	284°14.7	-21°43.2
22	229°56.9	168°18.6	19°56.0	121°07.7	23°29.4	331°31.0	-22°25.7	299°17.3	-21°43.2
23	244°59.4	183°17.9	19°56.7	136°08.5	23°29.2	346°33.8	-22°25.6	314°20.0	-21°43.2
Mer.pass.:6:42:		v-0.7 d0.7 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Stars

	SHA	Dec
Alpheratz	357°39.4	29°11.6
Ankaa	353°11.8	-42°11.9
Schedar	349°36.1	56°38.2
Diphda	348°51.8	-17°52.9
Achernar	335°24.1	-57°08.2
Hamal	327°56.4	23°33.0
Polaris	316°23.4	89°20.4
Akamar	315°15.6	-40°13.7
Menkar	314°11.1	4°09.8
Mirfak	308°35.0	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°28.0	6°21.9
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.6
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.6
Sirius	258°30.4	-16°44.6
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.8	-59°34.6
Suhail	222°49.7	-43°30.9
Miaplacidus	221°39.4	-69°48.1
Alphard	217°52.2	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.7	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.5	-63°12.6
Gacrux	171°56.2	-57°13.5
Alioth	166°16.9	55°51.6
Spica	158°26.8	-11°15.7
Alcaid	152°55.3	49°13.3
Hadar	148°41.6	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.6	-60°54.9
Zubenelg.	137°00.6	-16°07.3
Kochab	137°19.1	74°04.9
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°16.0	-37°06.9
Rasalhague	96°02.3	12°32.9
Etamin	90°43.7	51°29.2
Kaus Aust.	83°38.0	-34°22.3
Vega	80°35.8	38°48.1
Nunki	75°52.9	-26°16.2
Altair	62°04.1	8°55.1
Peacock	53°12.4	-56°40.1
Deneb	49°28.4	45°20.8
Enif	33°43.0	9°57.8
Alnair	27°38.5	-46°51.8
Fomalhaut	15°19.5	-29°31.1
Scheat	13°49.4	28°11.0
Markab	13°34.3	15°18.4

2019/6/9	SHA	Mer.pass
Venus	302°02.1	10:44
Mars	253°12.1	13:58
Jupiter	101°10.0	00:07
Saturn	69°09.5	02:15

2019/6/1	SHA	Mer.pass
Venus	300°46.8	10:45
Mars	252°30.4	13:57
Jupiter	101°18.2	00:03
Saturn	69°13.2	02:11

2019/6/1	SHA	Mer.pass
Venus	299°31.2	10:46
Mars	251°48.9	13:56
Jupiter	101°26.5	23:54
Saturn	69°16.9	02:06

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°13.1	22°53.2	102°23.5	8.3	14°21.3	-10.6	59.4
1	195°13.0	22°53.4	116°50.9	8.4	14°10.7	-10.7	59.4
2	210°12.9	22°53.6	131°18.4	8.5	13°59.9	-10.8	59.4
3	225°12.7	22°53.8	145°45.9	8.5	13°49.1	-10.9	59.4
4	240°12.6	22°54.0	160°13.4	8.6	13°38.2	-10.9	59.4
5	255°12.5	22°54.2	174°41.1	8.7	13°27.2	-11.0	59.4
6	270°12.4	22°54.4	189°08.7	8.7	13°16.2	-11.1	59.4
7	285°12.3	22°54.6	203°36.5	8.8	13°05.1	-11.2	59.4
8	300°12.1	22°54.9	218°04.3	8.8	12°53.8	-11.2	59.4
9	315°12.0	22°55.1	232°32.2	8.9	12°42.6	-11.3	59.4
10	330°11.9	22°55.3	247°00.1	9.0	12°31.2	-11.4	59.4
11	345°11.8	22°55.5	261°28.1	9.0	12°19.8	-11.5	59.4
12	0°11.6	22°55.7	275°56.1	9.1	12°08.3	-11.5	59.4
13	15°11.5	22°55.9	290°24.2	9.1	11°56.8	-11.6	59.4
14	30°11.4	22°56.1	304°52.4	9.2	11°45.1	-11.7	59.4
15	45°11.3	22°56.3	319°20.6	9.2	11°33.5	-11.7	59.4
16	60°11.2	22°56.5	333°48.9	9.3	11°21.7	-11.8	59.3
17	75°11.0	22°56.7	348°17.2	9.4	11°09.9	-11.8	59.3
18	90°10.9	22°56.9	2°45.6	9.4	10°58.0	-11.9	59.3
19	105°10.8	22°57.1	17°14.0	9.5	10°46.1	-12.0	59.3
20	120°10.7	22°57.3	31°42.5	9.5	10°34.1	-12.0	59.3
21	135°10.5	22°57.5	46°11.1	9.6	10°22.1	-12.1	59.3
22	150°10.4	22°57.7	60°39.7	9.6	10°09.9	-12.1	59.3
23	165°10.3	22°57.9	75°08.3	9.7	9°57.8	-12.2	59.3
	SD.=15.8	d=0.2			S.D.=16.2		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°10.2	22°58.1	89°37.0	9.7	9°45.6	-12.2	59.3
1	195°10.0	22°58.3	104°05.8	9.8	9°33.3	-12.3	59.3
2	210°09.9	22°58.5	118°34.6	9.8	9°21.0	-12.3	59.3
3	225°09.8	22°58.7	133°03.5	9.9	9°08.6	-12.4	59.3
4	240°09.7	22°58.9	147°32.4	9.9	8°56.2	-12.4	59.2
5	255°09.6	22°59.1	162°01.3	10.0	8°43.8	-12.5	59.2
6	270°09.4	22°59.3	176°30.3	10.0	8°31.3	-12.5	59.2
7	285°09.3	22°59.5	190°59.4	10.1	8°18.7	-12.6	59.2
8	300°09.2	22°59.7	205°28.5	10.1	8°06.1	-12.6	59.2
9	315°09.1	22°59.9	219°57.6	10.2	7°53.5	-12.6	59.2
10	330°08.9	23°00.1	234°26.8	10.2	7°40.8	-12.7	59.2
11	345°08.8	23°00.3	248°56.0	10.3	7°28.1	-12.7	59.2
12	0°08.7	23°00.5	263°25.3	10.3	7°15.4	-12.8	59.2
13	15°08.6	23°00.7	277°54.6	10.3	7°02.6	-12.8	59.2
14	30°08.4	23°00.9	292°24.0	10.4	6°49.8	-12.8	59.2
15	45°08.3	23°01.1	306°53.4	10.4	6°36.9	-12.9	59.1
16	60°08.2	23°01.2	321°22.8	10.5	6°24.1	-12.9	59.1
17	75°08.1	23°01.4	335°52.3	10.5	6°11.1	-12.9	59.1
18	90°07.9	23°01.6	350°21.8	10.5	5°58.2	-13.0	59.1
19	105°07.8	23°01.8	4°51.3	10.6	5°45.2	-13.0	59.1
20	120°07.7	23°02.0	19°20.9	10.6	5°32.2	-13.0	59.1
21	135°07.6	23°02.2	33°50.6	10.6	5°19.2	-13.0	59.1
22	150°07.4	23°02.4	48°20.2	10.7	5°06.2	-13.1	59.1
23	165°07.3	23°02.5	62°49.9	10.7	4°53.1	-13.1	59.1
	SD.=15.8	d=0.2			S.D.=16.2		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°07.2	23°02.7	77°19.6	10.7	4°40.0	-13.1	59.0
1	195°07.1	23°02.9	91°49.4	10.8	4°26.9	-13.1	59.0
2	210°06.9	23°03.1	106°19.2	10.8	4°13.8	-13.1	59.0
3	225°06.8	23°03.3	120°49.0	10.8	4°00.6	-13.2	59.0
4	240°06.7	23°03.5	135°18.9	10.9	3°47.5	-13.2	59.0
5	255°06.6	23°03.6	149°48.7	10.9	3°34.3	-13.2	59.0
6	270°06.4	23°03.8	164°18.6	10.9	3°21.1	-13.2	59.0
7	285°06.3	23°04.0	178°48.6	10.9	3°07.9	-13.2	59.0
8	300°06.2	23°04.2	193°18.5	11.0	2°54.6	-13.2	58.9
9	315°06.0	23°04.3	207°48.5	11.0	2°41.4	-13.2	58.9
10	330°05.9	23°04.5	222°18.5	11.0	2°28.2	-13.2	58.9
11	345°05.8	23°04.7	236°48.6	11.0	2°14.9	-13.3	58.9
12	0°05.7	23°04.9	251°18.6	11.1	2°01.7	-13.3	58.9
13	15°05.5	23°05.0	265°48.7	11.1	1°48.4	-13.3	58.9
14	30°05.4	23°05.2	280°18.8	11.1	1°35.1	-13.3	58.9
15	45°05.3	23°05.4	294°48.9	11.1	1°21.9	-13.3	58.9
16	60°05.2	23°05.6	309°19.0	11.1	1°08.6	-13.3	58.8
17	75°05.0	23°05.7	323°49.2	11.2	0°55.3	-13.3	58.8
18	90°04.9	23°05.9	338°19.4	11.2	0°42.1	-13.3	58.8
19	105°04.8	23°06.1	352°49.5	11.2	0°28.8	-13.3	58.8
20	120°04.7	23°06.2	7°19.7	11.2	0°15.5	-13.3	58.8
21	135°04.5	23°06.4	21°50.0	11.2	0°02.3	-13.3	58.8
22	150°04.4	23°06.6	36°20.2	11.2	-0°11.0	-13.3	58.8
23	165°04.3	23°06.7	50°50.4	11.2	-0°24.2	-13.2	58.8
	SD.=15.8	d=0.2			S.D.=16.1		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:31	23:34	–:–	–:–
64	–:–	–:–	01:40	22:20	–:–	–:–
62	–:–	–:–	02:15	21:45	–:–	–:–
60	–:–	01:03	02:39	21:20	22:58	–:–
58	–:–	01:47	02:59	21:00	22:13	–:–
56	–:–	02:14	03:15	20:44	21:45	–:–
54	00:58	02:36	03:29	20:30	21:24	23:03
52	01:38	02:53	03:41	20:18	21:07	22:22
50	02:04	03:07	03:51	20:08	20:52	21:56
45	02:47	03:36	04:13	19:46	20:23	21:12
40	03:17	03:58	04:31	19:28	20:01	20:42
35	03:40	04:16	04:46	19:13	19:43	20:19
30	03:58	04:31	04:58	19:01	19:28	20:01
20	04:26	04:55	05:20	18:39	19:03	19:33
10	04:49	05:16	05:39	18:20	18:43	19:10
0	05:07	05:33	05:56	18:03	18:26	18:52
-10	05:24	05:50	06:13	17:46	18:09	18:35
-20	05:40	06:07	06:31	17:28	17:52	18:19
-30	05:56	06:26	06:52	17:07	17:33	18:03
-35	06:04	06:36	07:04	16:55	17:23	17:54
-40	06:13	06:47	07:18	16:41	17:11	17:45
-45	06:23	07:01	07:34	16:24	16:58	17:35
-50	06:35	07:16	07:54	16:04	16:42	17:24
-52	06:40	07:23	08:04	15:55	16:35	17:19
-54	06:45	07:31	08:15	15:44	16:27	17:13
-56	06:51	07:40	08:27	15:31	16:18	17:07
-58	06:58	07:50	08:41	15:17	16:08	17:01
-60	07:05	08:02	08:58	15:00	15:57	16:53

		Moonrise			Moonset	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	08:34	10:50	12:56	02:31	02:05	01:46
70	08:59	11:02	12:58	02:05	01:51	01:40
68	09:17	11:11	13:00	01:45	01:40	01:35
66	09:32	11:19	13:02	01:29	01:31	01:32
64	09:44	11:25	13:03	01:16	01:23	01:28
62	09:54	11:30	13:05	01:05	01:16	01:25
60	10:03	11:35	13:06	00:55	01:10	01:23
58	10:11	11:39	13:07	00:47	01:05	01:20
56	10:17	11:43	13:07	00:39	01:00	01:18
54	10:23	11:46	13:08	00:32	00:56	01:17
52	10:29	11:49	13:09	00:26	00:52	01:15
50	10:33	11:52	13:10	00:21	00:49	01:13
45	10:44	11:58	13:11	00:09	00:41	01:10
40	10:52	12:03	13:12	–:–	00:35	01:07
35	10:60	12:07	13:13	–:–	00:29	01:05
30	11:06	12:11	13:14	–:–	00:24	01:02
20	11:17	12:17	13:15	–:–	00:16	00:59
10	11:27	12:23	13:17	–:–	00:08	00:55
0	11:36	12:28	13:18	–:–	00:01	00:52
-10	11:45	12:33	13:19	23:54	–:–	00:49
-20	11:55	12:39	13:21	23:46	–:–	00:45
-30	12:06	12:45	13:22	23:37	–:–	00:41
-35	12:12	12:49	13:23	23:32	–:–	00:39
-40	12:19	12:53	13:24	23:26	–:–	00:36
-45	12:27	12:58	13:25	23:19	–:–	00:33
-50	12:37	13:03	13:27	23:11	–:–	00:29
-52	12:42	13:06	13:27	23:07	–:–	00:27
-54	12:47	13:09	13:28	23:03	–:–	00:25
-56	12:53	13:12	13:29	22:58	–:–	00:23
-58	12:59	13:15	13:30	22:53	–:–	00:21
-60	13:06	13:19	13:31	22:47	–:–	00:18

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	00:52	00:47	11:59	17:48	05:22	6(42%)
10	00:41	00:35	11:59	18:39	06:14	7(53%)
11	00:29	00:23	11:59	19:29	07:04	8(64%)

June 12, 13 ,14 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	260°01.9	198°17.2	19°57.4	151°09.2	23°28.9	1°36.6	-22°25.6	329°22.6	-21°43.3
1	275°04.3	213°16.5	19°58.0	166°10.0	23°28.7	16°39.4	-22°25.6	344°25.2	-21°43.3
2	290°06.8	228°15.8	19°58.7	181°10.7	23°28.5	31°42.2	-22°25.6	359°27.8	-21°43.3
3	305°09.3	243°15.1	19°59.3	196°11.4	23°28.3	46°45.1	-22°25.6	14°30.5	-21°43.3
4	320°11.7	258°14.4	19°60.0	211°12.2	23°28.1	61°47.9	-22°25.5	29°33.1	-21°43.4
5	335°14.2	273°13.7	20°00.6	226°12.9	23°27.9	76°50.7	-22°25.5	44°35.7	-21°43.4
6	350°16.7	288°13.0	20°01.3	241°13.6	23°27.7	91°53.5	-22°25.5	59°38.3	-21°43.4
7	5°19.1	303°12.3	20°02.0	256°14.4	23°27.5	106°56.3	-22°25.5	74°41.0	-21°43.4
8	20°21.6	318°11.6	20°02.6	271°15.1	23°27.3	121°59.1	-22°25.5	89°43.6	-21°43.5
9	35°24.0	333°10.9	20°03.3	286°15.8	23°27.1	137°01.9	-22°25.4	104°46.2	-21°43.5
10	50°26.5	348°10.2	20°03.9	301°16.6	23°26.9	152°04.7	-22°25.4	119°48.8	-21°43.5
11	65°29.0	3°09.5	20°04.6	316°17.3	23°26.7	167°07.5	-22°25.4	134°51.5	-21°43.5
12	80°31.4	18°08.8	20°05.2	331°18.1	23°26.5	182°10.3	-22°25.4	149°54.1	-21°43.6
13	95°33.9	33°08.1	20°05.9	346°18.8	23°26.3	197°13.1	-22°25.4	164°56.7	-21°43.6
14	110°36.4	48°07.4	20°06.5	1°19.5	23°26.1	212°15.9	-22°25.3	179°59.3	-21°43.6
15	125°38.8	63°06.7	20°07.2	16°20.3	23°25.9	227°18.8	-22°25.3	195°02.0	-21°43.6
16	140°41.3	78°06.0	20°07.8	31°21.0	23°25.7	242°21.6	-22°25.3	210°04.6	-21°43.7
17	155°43.8	93°05.2	20°08.5	46°21.7	23°25.4	257°24.4	-22°25.3	225°07.2	-21°43.7
18	170°46.2	108°04.5	20°09.1	61°22.5	23°25.2	272°27.2	-22°25.3	240°09.8	-21°43.7
19	185°48.7	123°03.8	20°09.7	76°23.2	23°25.0	287°30.0	-22°25.2	255°12.5	-21°43.7
20	200°51.1	138°03.1	20°10.4	91°24.0	23°24.8	302°32.8	-22°25.2	270°15.1	-21°43.8
21	215°53.6	153°02.4	20°11.0	106°24.7	23°24.6	317°35.6	-22°25.2	285°17.7	-21°43.8
22	230°56.1	168°01.7	20°11.7	121°25.4	23°24.4	332°38.4	-22°25.2	300°20.3	-21°43.8
23	245°58.5	183°01.0	20°12.3	136°26.2	23°24.2	347°41.2	-22°25.2	315°23.0	-21°43.8
Mer.pass.:6:38:		v-0.7 d0.7 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	261°01.0	198°00.3	20°12.9	151°26.9	23°24.0	2°44.0	-22°25.1	330°25.6	-21°43.8
1	276°03.5	212°59.6	20°13.6	166°27.6	23°23.8	17°46.8	-22°25.1	345°28.2	-21°43.9
2	291°05.9	227°58.8	20°14.2	181°28.4	23°23.6	32°49.6	-22°25.1	0°30.8	-21°43.9
3	306°08.4	242°58.1	20°14.9	196°29.1	23°23.3	47°52.5	-22°25.1	15°33.5	-21°43.9
4	321°10.9	257°57.4	20°15.5	211°29.9	23°23.1	62°55.3	-22°25.1	30°36.1	-21°43.9
5	336°13.3	272°56.7	20°16.1	226°30.6	23°22.9	77°58.1	-22°25.0	45°38.7	-21°44.0
6	351°15.8	287°56.0	20°16.8	241°31.3	23°22.7	93°00.9	-22°25.0	60°41.3	-21°44.0
7	6°18.3	302°55.3	20°17.4	256°32.1	23°22.5	108°03.7	-22°25.0	75°44.0	-21°44.0
8	21°20.7	317°54.6	20°18.0	271°32.8	23°22.3	123°06.5	-22°25.0	90°46.6	-21°44.0
9	36°23.2	332°53.8	20°18.7	286°33.6	23°22.1	138°09.3	-22°25.0	105°49.2	-21°44.1
10	51°25.6	347°53.1	20°19.3	301°34.3	23°21.9	153°12.1	-22°24.9	120°51.8	-21°44.1
11	66°28.1	2°52.4	20°19.9	316°35.0	23°21.6	168°14.9	-22°24.9	135°54.5	-21°44.1
12	81°30.6	17°51.7	20°20.5	331°35.8	23°21.4	183°17.7	-22°24.9	150°57.1	-21°44.1
13	96°33.0	32°51.0	20°21.2	346°36.5	23°21.2	198°20.5	-22°24.9	165°59.7	-21°44.2
14	111°35.5	47°50.3	20°21.8	1°37.3	23°21.0	213°23.3	-22°24.8	181°02.3	-21°44.2
15	126°38.0	62°49.5	20°22.4	16°38.0	23°20.8	228°26.1	-22°24.8	196°05.0	-21°44.2
16	141°40.4	77°48.8	20°23.0	31°38.7	23°20.6	243°28.9	-22°24.8	211°07.6	-21°44.2
17	156°42.9	92°48.1	20°23.7	46°39.5	23°20.4	258°31.8	-22°24.8	226°10.2	-21°44.3
18	171°45.4	107°47.4	20°24.3	61°40.2	23°20.1	273°34.6	-22°24.8	241°12.9	-21°44.3
19	186°47.8	122°46.7	20°24.9	76°41.0	23°19.9	288°37.4	-22°24.7	256°15.5	-21°44.3
20	201°50.3	137°45.9	20°25.5	91°41.7	23°19.7	303°40.2	-22°24.7	271°18.1	-21°44.3
21	216°52.8	152°45.2	20°26.1	106°42.4	23°19.5	318°43.0	-22°24.7	286°20.7	-21°44.4
22	231°55.2	167°44.5	20°26.8	121°43.2	23°19.3	333°45.8	-22°24.7	301°23.4	-21°44.4
23	246°57.7	182°43.8	20°27.4	136°43.9	23°19.1	348°48.6	-22°24.7	316°26.0	-21°44.4
Mer.pass.:6:34:		v-0.7 d0.6 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	262°00.1	197°43.0	20°28.0	151°44.7	23°18.8	3°51.4	-22°24.6	331°28.6	-21°44.4
1	277°02.6	212°42.3	20°28.6	166°45.4	23°18.6	18°54.2	-22°24.6	346°31.3	-21°44.5
2	292°05.1	227°41.6	20°29.2	181°46.1	23°18.4	33°57.0	-22°24.6	1°33.9	-21°44.5
3	307°07.5	242°40.9	20°29.8	196°46.9	23°18.2	48°59.8	-22°24.6	16°36.5	-21°44.5
4	322°10.0	257°40.1	20°30.4	211°47.6	23°18.0	64°02.6	-22°24.6	31°39.1	-21°44.5
5	337°12.5	272°39.4	20°31.1	226°48.4	23°17.7	79°05.4	-22°24.5	46°41.8	-21°44.5
6	352°14.9	287°38.7	20°31.7	241°49.1	23°17.5	94°08.3	-22°24.5	61°44.4	-21°44.6
7	7°17.4	302°38.0	20°32.3	256°49.9	23°17.3	109°11.1	-22°24.5	76°47.0	-21°44.6
8	22°19.9	317°37.2	20°32.9	271°50.6	23°17.1	124°13.9	-22°24.5	91°49.7	-21°44.6
9	37°22.3	332°36.5	20°33.5	286°51.3	23°16.9	139°16.7	-22°24.5	106°52.3	-21°44.6
10	52°24.8	347°35.8	20°34.1	301°52.1	23°16.6	154°19.5	-22°24.4	121°54.9	-21°44.7
11	67°27.2	2°35.1	20°34.7	316°52.8	23°16.4	169°22.3	-22°24.4	136°57.5	-21°44.7
12	82°29.7	17°34.3	20°35.3	331°53.6	23°16.2	184°25.1	-22°24.4	152°00.2	-21°44.7
13	97°32.2	32°33.6	20°35.9	346°54.3	23°16.0	199°27.9	-22°24.4	167°02.8	-21°44.7
14	112°34.6	47°32.9	20°36.5	1°55.1	23°15.8	214°30.7	-22°24.4	182°05.4	-21°44.8
15	127°37.1	62°32.1	20°37.1	16°55.8	23°15.5	229°33.5	-22°24.3	197°08.1	-21°44.8
16	142°39.6	77°31.4	20°37.7	31°56.5	23°15.3	244°36.3	-22°24.3	212°10.7	-21°44.8
17	157°42.0	92°30.7	20°38.3	46°57.3	23°15.1	259°39.1	-22°24.3	227°13.3	-21°44.8
18	172°44.5	107°30.0	20°38.9	61°58.0	23°14.9	274°41.9	-22°24.3	242°15.9	-21°44.9
19	187°47.0	122°29.2	20°39.5	76°58.8	23°14.6	289°44.7	-22°24.3	257°18.6	-21°44.9
20	202°49.4	137°28.5	20°40.1	91°59.5	23°14.4	304°47.5	-22°24.2	272°21.2	-21°44.9
21	217°51.9	152°27.8	20°40.7	107°00.3	23°14.2	319°50.4	-22°24.2	287°23.8	-21°44.9
22	232°54.4	167°27.0	20°41.3	122°01.0	23°14.0	334°53.2	-22°24.2	302°26.5	-21°45.0
23	247°56.8	182°26.3	20°41.9	137°01.7	23°13.7	349°56.0	-22°24.2	317°29.1	-21°45.0
Mer.pass.:6:30:		v-0.7 d0.6 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Stars

	SHA	**Dec**
Alpheratz	357°39.4	29°11.6
Ankaa	353°11.8	-42°11.9
Schedar	349°36.1	56°38.2
Diphda	348°51.8	-17°52.9
Achernar	335°24.1	-57°08.2
Hamal	327°56.4	23°33.0
Polaris	316°22.5	89°20.4
Akamar	315°15.6	-40°13.7
Menkar	314°11.1	4°09.8
Mirfak	308°35.0	49°55.5
Aldebaran	290°45.1	16°32.7
Rigel	281°08.5	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°28.0	6°21.9
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.6
Sirius	258°30.4	-16°44.5
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.9	-59°34.5
Suhail	222°49.7	-43°30.9
Miaplacidus	221°39.4	-69°48.1
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.8	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.6	-63°12.6
Gacrux	171°56.2	-57°13.5
Alioth	166°16.9	55°51.6
Spica	158°26.8	-11°15.7
Alcaid	152°55.4	49°13.3
Hadar	148°41.6	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.7	-60°54.9
Zubenelg.	137°00.6	-16°07.3
Kochab	137°19.1	74°04.9
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°16.0	-37°06.9
Rasalhague	96°02.3	12°32.9
Etamin	90°43.7	51°29.2
Kaus Aust.	83°38.0	-34°22.3
Vega	80°35.8	38°48.1
Nunki	75°52.9	-26°16.2
Altair	62°04.1	8°55.2
Peacock	53°12.4	-56°40.1
Deneb	49°28.4	45°20.8
Enif	33°43.0	9°57.8
Alnair	27°38.5	-46°51.8
Fomalhaut	15°19.5	-29°31.1
Scheat	13°49.4	28°11.0
Markab	13°34.3	15°18.4

2019/6/1	**SHA**	**Mer.pass**
Venus	298°15.4	10:47
Mars	251°07.3	13:55
Jupiter	101°34.8	23:49
Saturn	69°20.7	02:02

2019/6/1	**SHA**	**Mer.pass**
Venus	296°59.3	10:48
Mars	250°25.9	13:54
Jupiter	101°43.0	23:45
Saturn	69°24.6	01:58

2019/6/1	**SHA**	**Mer.pass**
Venus	295°42.9	10:50
Mars	249°44.5	13:52
Jupiter	101°51.3	23:40
Saturn	69°28.5	01:54

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°04.1	23°06.9	65°20.7	11.3	-0°37.5	-13.2	58.7
1	195°04.0	23°07.1	79°51.0	11.3	-0°50.7	-13.2	58.7
2	210°03.9	23°07.2	94°21.2	11.3	-1°03.9	-13.2	58.7
3	225°03.8	23°07.4	108°51.5	11.3	-1°17.2	-13.2	58.7
4	240°03.6	23°07.6	123°21.8	11.3	-1°30.4	-13.2	58.7
5	255°03.5	23°07.7	137°52.1	11.3	-1°43.5	-13.2	58.7
6	270°03.4	23°07.9	152°22.4	11.3	-1°56.7	-13.2	58.7
7	285°03.3	23°08.0	166°52.7	11.3	-2°09.9	-13.1	58.6
8	300°03.1	23°08.2	181°23.0	11.3	-2°23.0	-13.1	58.6
9	315°03.0	23°08.4	195°53.4	11.3	-2°36.1	-13.1	58.6
10	330°02.9	23°08.5	210°23.7	11.3	-2°49.2	-13.1	58.6
11	345°02.7	23°08.7	224°54.0	11.3	-3°02.3	-13.1	58.6
12	0°02.6	23°08.8	239°24.3	11.3	-3°15.4	-13.0	58.6
13	15°02.5	23°09.0	253°54.7	11.3	-3°28.4	-13.0	58.5
14	30°02.4	23°09.2	268°25.0	11.3	-3°41.4	-13.0	58.5
15	45°02.2	23°09.3	282°55.3	11.3	-3°54.4	-13.0	58.5
16	60°02.1	23°09.5	297°25.7	11.3	-4°07.4	-12.9	58.5
17	75°02.0	23°09.6	311°56.0	11.3	-4°20.3	-12.9	58.5
18	90°01.8	23°09.8	326°26.3	11.3	-4°33.2	-12.9	58.5
19	105°01.7	23°09.9	340°56.6	11.3	-4°46.1	-12.9	58.5
20	120°01.6	23°10.1	355°26.9	11.3	-4°58.9	-12.8	58.4
21	135°01.5	23°10.2	9°57.2	11.3	-5°11.7	-12.8	58.4
22	150°01.3	23°10.4	24°27.5	11.3	-5°24.5	-12.8	58.4
23	165°01.2	23°10.5	38°57.8	11.3	-5°37.3	-12.7	58.4
	SD.=15.8	d=0.2			S.D.=16.0		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°01.1	23°10.7	53°28.1	11.3	-5°50.0	-12.7	58.4
1	195°00.9	23°10.8	67°58.4	11.3	-6°02.7	-12.7	58.4
2	210°00.8	23°11.0	82°28.7	11.3	-6°15.3	-12.6	58.3
3	225°00.7	23°11.1	96°58.9	11.3	-6°27.9	-12.6	58.3
4	240°00.6	23°11.3	111°29.2	11.2	-6°40.4	-12.5	58.3
5	255°00.4	23°11.4	125°59.4	11.2	-6°53.0	-12.5	58.3
6	270°00.3	23°11.6	140°29.6	11.2	-7°05.4	-12.5	58.3
7	285°00.2	23°11.7	154°59.8	11.2	-7°17.9	-12.4	58.3
8	300°00.0	23°11.8	169°30.0	11.2	-7°30.3	-12.4	58.2
9	314°59.9	23°12.0	184°00.2	11.2	-7°42.6	-12.3	58.2
10	329°59.8	23°12.1	198°30.4	11.2	-7°54.9	-12.3	58.2
11	344°59.6	23°12.3	213°00.5	11.1	-8°07.1	-12.2	58.2
12	359°59.5	23°12.4	227°30.6	11.1	-8°19.3	-12.2	58.2
13	14°59.4	23°12.5	242°00.8	11.1	-8°31.5	-12.1	58.2
14	29°59.3	23°12.7	256°30.9	11.1	-8°43.6	-12.1	58.1
15	44°59.1	23°12.8	271°01.0	11.1	-8°55.6	-12.0	58.1
16	59°59.0	23°13.0	285°31.0	11.1	-9°07.6	-12.0	58.1
17	74°58.9	23°13.1	300°01.1	11.0	-9°19.6	-11.9	58.1
18	89°58.7	23°13.2	314°31.1	11.0	-9°31.5	-11.9	58.1
19	104°58.6	23°13.4	329°01.1	11.0	-9°43.3	-11.8	58.1
20	119°58.5	23°13.5	343°31.1	11.0	-9°55.1	-11.7	58.0
21	134°58.3	23°13.6	358°01.0	11.0	-10°06.8	-11.7	58.0
22	149°58.2	23°13.8	12°31.0	10.9	-10°18.4	-11.6	58.0
23	164°58.1	23°13.9	27°00.9	10.9	-10°30.0	-11.6	58.0
	SD.=15.7	d=0.1			S.D.=15.9		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°58.0	23°14.0	41°30.8	10.9	-10°41.5	-11.5	58.0
1	194°57.8	23°14.2	56°00.7	10.9	-10°53.0	-11.4	57.9
2	209°57.7	23°14.3	70°30.5	10.8	-11°04.4	-11.4	57.9
3	224°57.6	23°14.4	85°00.4	10.8	-11°15.8	-11.3	57.9
4	239°57.4	23°14.6	99°30.2	10.8	-11°27.0	-11.2	57.9
5	254°57.3	23°14.7	113°59.9	10.8	-11°38.2	-11.2	57.9
6	269°57.2	23°14.8	128°29.7	10.7	-11°49.4	-11.1	57.9
7	284°57.0	23°14.9	142°59.4	10.7	-12°00.4	-11.0	57.8
8	299°56.9	23°15.1	157°29.1	10.7	-12°11.4	-11.0	57.8
9	314°56.8	23°15.2	171°58.8	10.7	-12°22.4	-10.9	57.8
10	329°56.6	23°15.3	186°28.5	10.6	-12°33.2	-10.8	57.8
11	344°56.5	23°15.4	200°58.1	10.6	-12°44.0	-10.7	57.8
12	359°56.4	23°15.6	215°27.7	10.6	-12°54.7	-10.7	57.7
13	14°56.2	23°15.7	229°57.2	10.6	-13°05.4	-10.6	57.7
14	29°56.1	23°15.8	244°26.8	10.5	-13°15.9	-10.5	57.7
15	44°56.0	23°15.9	258°56.3	10.5	-13°26.4	-10.4	57.7
16	59°55.9	23°16.1	273°25.8	10.5	-13°36.8	-10.4	57.7
17	74°55.7	23°16.2	287°55.3	10.4	-13°47.2	-10.3	57.6
18	89°55.6	23°16.3	302°24.7	10.4	-13°57.4	-10.2	57.6
19	104°55.5	23°16.4	316°54.1	10.4	-14°07.6	-10.1	57.6
20	119°55.3	23°16.5	331°23.5	10.4	-14°17.7	-10.0	57.6
21	134°55.2	23°16.6	345°52.8	10.3	-14°27.7	-10.0	57.6
22	149°55.1	23°16.8	0°22.1	10.3	-14°37.6	-9.9	57.5
23	164°54.9	23°16.9	14°51.4	10.3	-14°47.4	-9.8	57.5
	SD.=15.7	d=0.1			S.D.=15.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:36	22:25	–:–	–:–
62	–:–	–:–	02:12	21:49	–:–	–:–
60	–:–	00:57	02:37	21:23	23:05	–:–
58	–:–	01:43	02:57	21:03	22:18	–:–
56	–:–	02:12	03:14	20:47	21:49	–:–
54	00:52	02:34	03:28	20:33	21:27	23:09
52	01:35	02:51	03:40	20:20	21:09	22:26
50	02:02	03:06	03:51	20:10	20:54	21:59
45	02:46	03:36	04:13	19:47	20:25	21:14
40	03:16	03:58	04:31	19:30	20:02	20:44
35	03:39	04:16	04:46	19:15	19:44	20:21
30	03:58	04:31	04:58	19:02	19:29	20:02
20	04:27	04:56	05:20	18:40	19:04	19:34
10	04:49	05:16	05:39	18:21	18:44	19:11
0	05:08	05:34	05:56	18:04	18:26	18:52
-10	05:25	05:51	06:14	17:46	18:09	18:36
-20	05:41	06:08	06:32	17:28	17:52	18:19
-30	05:57	06:27	06:53	17:07	17:33	18:03
-35	06:05	06:37	07:05	16:55	17:23	17:55
-40	06:15	06:49	07:19	16:41	17:11	17:45
-45	06:25	07:02	07:36	16:24	16:58	17:35
-50	06:37	07:18	07:56	16:04	16:42	17:23
-52	06:42	07:25	08:06	15:54	16:35	17:18
-54	06:47	07:33	08:17	15:43	16:27	17:13
-56	06:53	07:42	08:30	15:30	16:18	17:07
-58	07:00	07:52	08:44	15:16	16:07	16:60
-60	07:07	08:04	09:01	14:59	15:56	16:52

		Moonrise			**Moonset**	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	14:59	17:04	19:20	01:28	01:10	00:49
70	14:53	16:48	18:49	01:29	01:19	01:06
68	14:48	16:36	18:26	01:31	01:26	01:21
66	14:44	16:26	18:08	01:32	01:32	01:32
64	14:41	16:17	17:54	01:32	01:37	01:42
62	14:38	16:10	17:42	01:33	01:41	01:50
60	14:35	16:04	17:32	01:34	01:45	01:58
58	14:33	15:59	17:23	01:34	01:49	02:04
56	14:31	15:54	17:15	01:35	01:52	02:10
54	14:29	15:49	17:09	01:35	01:54	02:15
52	14:28	15:46	17:03	01:36	01:57	02:19
50	14:26	15:42	16:57	01:36	01:59	02:24
45	14:23	15:35	16:45	01:37	02:04	02:33
40	14:20	15:28	16:35	01:38	02:08	02:40
35	14:18	15:23	16:27	01:38	02:12	02:47
30	14:16	15:18	16:20	01:39	02:15	02:53
20	14:13	15:10	16:07	01:40	02:21	03:03
10	14:10	15:03	15:56	01:41	02:26	03:12
0	14:07	14:56	15:46	01:41	02:31	03:20
-10	14:04	14:50	15:36	01:42	02:35	03:28
-20	14:02	14:43	15:26	01:43	02:40	03:37
-30	13:58	14:35	15:14	01:44	02:46	03:48
-35	13:57	14:31	15:07	01:44	02:49	03:54
-40	13:55	14:26	14:59	01:45	02:53	04:00
-45	13:52	14:20	14:50	01:45	02:57	04:08
-50	13:49	14:13	14:39	01:46	03:02	04:18
-52	13:48	14:10	14:33	01:46	03:05	04:22
-54	13:47	14:06	14:28	01:47	03:07	04:27
-56	13:45	14:02	14:22	01:47	03:10	04:33
-58	13:44	13:58	14:15	01:48	03:14	04:39
-60	13:42	13:53	14:07	01:48	03:17	04:46

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	00:17	00:10	11:59	20:18	07:54	9(75%)
13	00:04	00:02	12:00	21:08	08:43	10(84%)
14	00:08	00:14	12:00	21:58	09:33	11(91%)

June 15, 16 ,17 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	262°59.3	197°25.6	20°42.5	152°02.5	23°13.5	4°58.8	-22°24.2	332°31.7	-21°45.0
1	278°01.7	212°24.8	20°43.1	167°03.2	23°13.3	20°01.6	-22°24.1	347°34.4	-21°45.0
2	293°04.2	227°24.1	20°43.7	182°04.0	23°13.1	35°04.4	-22°24.1	2°37.0	-21°45.1
3	308°06.7	242°23.4	20°44.3	197°04.7	23°12.8	50°07.2	-22°24.1	17°39.6	-21°45.1
4	323°09.1	257°22.6	20°44.9	212°05.5	23°12.6	65°10.0	-22°24.1	32°42.3	-21°45.1
5	338°11.6	272°21.9	20°45.4	227°06.2	23°12.4	80°12.8	-22°24.0	47°44.9	-21°45.1
6	353°14.1	287°21.2	20°46.0	242°07.0	23°12.2	95°15.6	-22°24.0	62°47.5	-21°45.2
7	8°16.5	302°20.4	20°46.6	257°07.7	23°11.9	110°18.4	-22°24.0	77°50.1	-21°45.2
8	23°19.0	317°19.7	20°47.2	272°08.5	23°11.7	125°21.2	-22°24.0	92°52.8	-21°45.2
9	38°21.5	332°18.9	20°47.8	287°09.2	23°11.5	140°24.0	-22°24.0	107°55.4	-21°45.2
10	53°23.9	347°18.2	20°48.4	302°09.9	23°11.3	155°26.8	-22°23.9	122°58.0	-21°45.3
11	68°26.4	2°17.5	20°48.9	317°10.7	23°11.0	170°29.6	-22°23.9	138°00.7	-21°45.3
12	83°28.9	17°16.7	20°49.5	332°11.4	23°10.8	185°32.4	-22°23.9	153°03.3	-21°45.3
13	98°31.3	32°16.0	20°50.1	347°12.2	23°10.6	200°35.2	-22°23.9	168°05.9	-21°45.3
14	113°33.8	47°15.2	20°50.7	2°12.9	23°10.3	215°38.1	-22°23.9	183°08.6	-21°45.4
15	128°36.2	62°14.5	20°51.3	17°13.7	23°10.1	230°40.9	-22°23.8	198°11.2	-21°45.4
16	143°38.7	77°13.8	20°51.8	32°14.4	23°09.9	245°43.7	-22°23.8	213°13.8	-21°45.4
17	158°41.2	92°13.0	20°52.4	47°15.2	23°09.7	260°46.5	-22°23.8	228°16.5	-21°45.4
18	173°43.6	107°12.3	20°53.0	62°15.9	23°09.4	275°49.3	-22°23.8	243°19.1	-21°45.5
19	188°46.1	122°11.5	20°53.6	77°16.7	23°09.2	290°52.1	-22°23.8	258°21.7	-21°45.5
20	203°48.6	137°10.8	20°54.1	92°17.4	23°09.0	305°54.9	-22°23.7	273°24.4	-21°45.5
21	218°51.0	152°10.1	20°54.7	107°18.1	23°08.7	320°57.7	-22°23.7	288°27.0	-21°45.5
22	233°53.5	167°09.3	20°55.3	122°18.9	23°08.5	336°00.5	-22°23.7	303°29.6	-21°45.6
23	248°56.0	182°08.6	20°55.9	137°19.6	23°08.3	351°03.3	-22°23.7	318°32.3	-21°45.6
Mer.pass.:6:26:		v-0.7 d0.6 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	263°58.4	197°07.8	20°56.4	152°20.4	23°08.0	6°06.1	-22°23.7	333°34.9	-21°45.6
1	279°00.9	212°07.1	20°57.0	167°21.1	23°07.8	21°08.9	-22°23.6	348°37.5	-21°45.6
2	294°03.4	227°06.3	20°57.6	182°21.9	23°07.6	36°11.7	-22°23.6	3°40.2	-21°45.7
3	309°05.8	242°05.6	20°58.1	197°22.6	23°07.3	51°14.5	-22°23.6	18°42.8	-21°45.7
4	324°08.3	257°04.8	20°58.7	212°23.4	23°07.1	66°17.3	-22°23.6	33°45.4	-21°45.7
5	339°10.7	272°04.1	20°59.3	227°24.1	23°06.9	81°20.1	-22°23.6	48°48.1	-21°45.7
6	354°13.2	287°03.4	20°59.8	242°24.9	23°06.6	96°22.9	-22°23.5	63°50.7	-21°45.8
7	9°15.7	302°02.6	21°00.4	257°25.6	23°06.4	111°25.7	-22°23.5	78°53.3	-21°45.8
8	24°18.1	317°01.9	21°00.9	272°26.4	23°06.2	126°28.5	-22°23.5	93°56.0	-21°45.8
9	39°20.6	332°01.1	21°01.5	287°27.1	23°05.9	141°31.4	-22°23.5	108°58.6	-21°45.8
10	54°23.1	347°00.4	21°02.1	302°27.9	23°05.7	156°34.2	-22°23.4	124°01.2	-21°45.9
11	69°25.5	1°59.6	21°02.6	317°28.6	23°05.5	171°37.0	-22°23.4	139°03.9	-21°45.9
12	84°28.0	16°58.9	21°03.2	332°29.4	23°05.2	186°39.8	-22°23.4	154°06.5	-21°45.9
13	99°30.5	31°58.1	21°03.7	347°30.1	23°05.0	201°42.6	-22°23.4	169°09.1	-21°45.9
14	114°32.9	46°57.4	21°04.3	2°30.9	23°04.8	216°45.4	-22°23.4	184°11.8	-21°46.0
15	129°35.4	61°56.6	21°04.9	17°31.6	23°04.5	231°48.2	-22°23.3	199°14.4	-21°46.0
16	144°37.9	76°55.9	21°05.4	32°32.4	23°04.3	246°51.0	-22°23.3	214°17.0	-21°46.0
17	159°40.3	91°55.1	21°06.0	47°33.1	23°04.0	261°53.8	-22°23.3	229°19.7	-21°46.0
18	174°42.8	106°54.4	21°06.5	62°33.9	23°03.8	276°56.6	-22°23.3	244°22.3	-21°46.1
19	189°45.2	121°53.6	21°07.1	77°34.6	23°03.6	291°59.4	-22°23.3	259°24.9	-21°46.1
20	204°47.7	136°52.9	21°07.6	92°35.4	23°03.3	307°02.2	-22°23.2	274°27.6	-21°46.1
21	219°50.2	151°52.1	21°08.2	107°36.1	23°03.1	322°05.0	-22°23.2	289°30.2	-21°46.1
22	234°52.6	166°51.3	21°08.7	122°36.9	23°02.9	337°07.8	-22°23.2	304°32.8	-21°46.2
23	249°55.1	181°50.6	21°09.3	137°37.6	23°02.6	352°10.6	-22°23.2	319°35.5	-21°46.2
Mer.pass.:6:23:		v-0.7 d0.6 m-3.8		v0.7 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	264°57.6	196°49.8	21°09.8	152°38.4	23°02.4	7°13.4	-22°23.2	334°38.1	-21°46.2
1	280°00.0	211°49.1	21°10.3	167°39.1	23°02.1	22°16.2	-22°23.1	349°40.7	-21°46.2
2	295°02.5	226°48.3	21°10.9	182°39.9	23°01.9	37°19.0	-22°23.1	4°43.4	-21°46.3
3	310°05.0	241°47.6	21°11.4	197°40.6	23°01.7	52°21.8	-22°23.1	19°46.0	-21°46.3
4	325°07.4	256°46.8	21°12.0	212°41.4	23°01.4	67°24.6	-22°23.1	34°48.6	-21°46.3
5	340°09.9	271°46.1	21°12.5	227°42.1	23°01.2	82°27.4	-22°23.1	49°51.3	-21°46.3
6	355°12.3	286°45.3	21°13.1	242°42.9	23°00.9	97°30.2	-22°23.0	64°53.9	-21°46.4
7	10°14.8	301°44.5	21°13.6	257°43.6	23°00.7	112°33.0	-22°23.0	79°56.6	-21°46.4
8	25°17.3	316°43.8	21°14.1	272°44.4	23°00.4	127°35.8	-22°23.0	94°59.2	-21°46.4
9	40°19.7	331°43.0	21°14.7	287°45.1	23°00.2	142°38.6	-22°23.0	110°01.8	-21°46.4
10	55°22.2	346°42.3	21°15.2	302°45.9	22°60.0	157°41.4	-22°23.0	125°04.5	-21°46.5
11	70°24.7	1°41.5	21°15.7	317°46.6	22°59.7	172°44.3	-22°22.9	140°07.1	-21°46.5
12	85°27.1	16°40.8	21°16.3	332°47.4	22°59.5	187°47.1	-22°22.9	155°09.7	-21°46.5
13	100°29.6	31°40.0	21°16.8	347°48.1	22°59.2	202°49.9	-22°22.9	170°12.4	-21°46.5
14	115°32.1	46°39.2	21°17.3	2°48.9	22°59.0	217°52.7	-22°22.9	185°15.0	-21°46.6
15	130°34.5	61°38.5	21°17.9	17°49.6	22°58.7	232°55.5	-22°22.8	200°17.6	-21°46.6
16	145°37.0	76°37.7	21°18.4	32°50.4	22°58.5	247°58.3	-22°22.8	215°20.3	-21°46.6
17	160°39.5	91°37.0	21°18.9	47°51.1	22°58.3	263°01.1	-22°22.8	230°22.9	-21°46.6
18	175°41.9	106°36.2	21°19.4	62°51.9	22°58.0	278°03.9	-22°22.8	245°25.5	-21°46.7
19	190°44.4	121°35.4	21°20.0	77°52.6	22°57.8	293°06.7	-22°22.8	260°28.2	-21°46.7
20	205°46.8	136°34.7	21°20.5	92°53.4	22°57.5	308°09.5	-22°22.7	275°30.8	-21°46.7
21	220°49.3	151°33.9	21°21.0	107°54.1	22°57.3	323°12.3	-22°22.7	290°33.5	-21°46.7
22	235°51.8	166°33.1	21°21.5	122°54.9	22°57.0	338°15.1	-22°22.7	305°36.1	-21°46.8
23	250°54.2	181°32.4	21°22.1	137°55.6	22°56.8	353°17.9	-22°22.7	320°38.7	-21°46.8
Mer.pass.:6:19:		v-0.8 d0.5 m-3.8		v0.8 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Stars

	SHA	Dec
Alpheratz	357°39.3	29°11.6
Ankaa	353°11.7	-42°11.9
Schedar	349°36.0	56°38.2
Diphda	348°51.8	-17°52.8
Achernar	335°24.1	-57°08.2
Hamal	327°56.4	23°33.0
Polaris	316°21.3	89°20.4
Akamar	315°15.6	-40°13.6
Menkar	314°11.0	4°09.8
Mirfak	308°34.9	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.5	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°28.0	6°21.9
Elnath	278°07.9	28°37.3
Alnilam	275°42.6	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.5
Sirius	258°30.4	-16°44.5
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.9	-59°34.5
Suhail	222°49.7	-43°30.9
Miaplacidus	221°39.5	-69°48.1
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.8	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.6	-63°12.6
Gacrux	171°56.2	-57°13.5
Alioth	166°16.9	55°51.6
Spica	158°26.8	-11°15.7
Alcaid	152°55.4	49°13.3
Hadar	148°41.7	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.7	-60°54.9
Zubenelg.	137°00.6	-16°07.2
Kochab	137°19.2	74°04.9
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°32.9
Etamin	90°43.7	51°29.3
Kaus Aust.	83°38.0	-34°22.3
Vega	80°35.8	38°48.1
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.2
Peacock	53°12.4	-56°40.1
Deneb	49°28.4	45°20.8
Enif	33°43.0	9°57.8
Alnair	27°38.4	-46°51.8
Fomalhaut	15°19.5	-29°31.0
Scheat	13°49.4	28°11.0
Markab	13°34.2	15°18.4

2019/6/1	SHA	Mer.pass
Venus	294°26.3	10:51
Mars	249°03.2	13:51
Jupiter	101°59.5	23:36
Saturn	69°32.4	01:50

2019/6/1	SHA	Mer.pass
Venus	293°09.4	10:52
Mars	248°22.0	13:50
Jupiter	102°07.7	23:31
Saturn	69°36.5	01:45

2019/6/1	SHA	Mer.pass
Venus	291°52.3	10:53
Mars	247°40.8	13:49
Jupiter	102°15.9	23:27
Saturn	69°40.5	01:41

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°54.8	23°17.0	29°20.7	10.2	-14°57.2	-9.7	57.5
1	194°54.7	23°17.1	43°49.9	10.2	-15°06.9	-9.6	57.5
2	209°54.5	23°17.2	58°19.1	10.2	-15°16.4	-9.5	57.5
3	224°54.4	23°17.3	72°48.3	10.2	-15°25.9	-9.4	57.4
4	239°54.3	23°17.4	87°17.4	10.1	-15°35.3	-9.4	57.4
5	254°54.1	23°17.6	101°46.5	10.1	-15°44.6	-9.3	57.4
6	269°54.0	23°17.7	116°15.6	10.1	-15°53.9	-9.2	57.4
7	284°53.9	23°17.8	130°44.7	10.0	-16°03.0	-9.1	57.4
8	299°53.7	23°17.9	145°13.7	10.0	-16°12.0	-9.0	57.3
9	314°53.6	23°18.0	159°42.7	10.0	-16°21.0	-8.9	57.3
10	329°53.5	23°18.1	174°11.7	10.0	-16°29.8	-8.8	57.3
11	344°53.3	23°18.2	188°40.6	9.9	-16°38.6	-8.7	57.3
12	359°53.2	23°18.3	203°09.5	9.9	-16°47.3	-8.6	57.3
13	14°53.1	23°18.4	217°38.4	9.9	-16°55.8	-8.5	57.2
14	29°53.0	23°18.5	232°07.3	9.8	-17°04.3	-8.4	57.2
15	44°52.8	23°18.6	246°36.1	9.8	-17°12.7	-8.3	57.2
16	59°52.7	23°18.7	261°04.9	9.8	-17°20.9	-8.2	57.2
17	74°52.6	23°18.8	275°33.7	9.8	-17°29.1	-8.1	57.2
18	89°52.4	23°18.9	290°02.4	9.7	-17°37.2	-8.0	57.1
19	104°52.3	23°19.0	304°31.2	9.7	-17°45.2	-7.9	57.1
20	119°52.2	23°19.1	318°59.8	9.7	-17°53.0	-7.8	57.1
21	134°52.0	23°19.2	333°28.5	9.7	-18°00.8	-7.7	57.1
22	149°51.9	23°19.3	347°57.2	9.6	-18°08.5	-7.6	57.0
23	164°51.8	23°19.4	2°25.8	9.6	-18°16.0	-7.5	57.0
	SD.=15.7	d=0.1			S.D.=15.7		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	179°51.6	23°19.5	16°54.4	9.6	-18°23.5	-7.4	57.0
1	194°51.5	23°19.6	31°22.9	9.6	-18°30.8	-7.3	57.0
2	209°51.4	23°19.7	45°51.5	9.5	-18°38.1	-7.2	57.0
3	224°51.2	23°19.8	60°20.0	9.5	-18°45.2	-7.1	56.9
4	239°51.1	23°19.9	74°48.5	9.5	-18°52.3	-7.0	56.9
5	254°51.0	23°20.0	89°17.0	9.5	-18°59.2	-6.9	56.9
6	269°50.8	23°20.1	103°45.5	9.4	-19°06.0	-6.8	56.9
7	284°50.7	23°20.2	118°13.9	9.4	-19°12.7	-6.7	56.8
8	299°50.6	23°20.3	132°42.3	9.4	-19°19.3	-6.5	56.8
9	314°50.4	23°20.4	147°10.7	9.4	-19°25.8	-6.4	56.8
10	329°50.3	23°20.5	161°39.1	9.4	-19°32.2	-6.3	56.8
11	344°50.2	23°20.6	176°07.4	9.3	-19°38.4	-6.2	56.8
12	359°50.0	23°20.6	190°35.8	9.3	-19°44.6	-6.1	56.7
13	14°49.9	23°20.7	205°04.1	9.3	-19°50.6	-6.0	56.7
14	29°49.8	23°20.8	219°32.4	9.3	-19°56.6	-5.9	56.7
15	44°49.6	23°20.9	234°00.7	9.3	-20°02.4	-5.8	56.7
16	59°49.5	23°21.0	248°28.9	9.3	-20°08.1	-5.6	56.7
17	74°49.4	23°21.1	262°57.2	9.2	-20°13.7	-5.5	56.6
18	89°49.2	23°21.2	277°25.4	9.2	-20°19.2	-5.4	56.6
19	104°49.1	23°21.2	291°53.7	9.2	-20°24.5	-5.3	56.6
20	119°49.0	23°21.3	306°21.9	9.2	-20°29.8	-5.2	56.6
21	134°48.8	23°21.4	320°50.1	9.2	-20°34.9	-5.1	56.5
22	149°48.7	23°21.5	335°18.2	9.2	-20°39.9	-5.0	56.5
23	164°48.6	23°21.6	349°46.4	9.2	-20°44.8	-4.8	56.5
	SD.=15.7	d=0.1			S.D.=15.6		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°48.4	23°21.7	4°14.6	9.2	-20°49.6	-4.7	56.5
1	194°48.3	23°21.7	18°42.7	9.2	-20°54.3	-4.6	56.5
2	209°48.2	23°21.8	33°10.9	9.1	-20°58.8	-4.5	56.4
3	224°48.0	23°21.9	47°39.0	9.1	-21°03.2	-4.4	56.4
4	239°47.9	23°22.0	62°07.2	9.1	-21°07.5	-4.2	56.4
5	254°47.8	23°22.0	76°35.3	9.1	-21°11.7	-4.1	56.4
6	269°47.6	23°22.1	91°03.4	9.1	-21°15.8	-4.0	56.3
7	284°47.5	23°22.2	105°31.5	9.1	-21°19.7	-3.9	56.3
8	299°47.4	23°22.3	119°59.7	9.1	-21°23.6	-3.8	56.3
9	314°47.2	23°22.3	134°27.8	9.1	-21°27.3	-3.7	56.3
10	329°47.1	23°22.4	148°55.9	9.1	-21°30.9	-3.5	56.3
11	344°46.9	23°22.5	163°24.0	9.1	-21°34.4	-3.4	56.2
12	359°46.8	23°22.6	177°52.1	9.1	-21°37.7	-3.3	56.2
13	14°46.7	23°22.6	192°20.2	9.1	-21°41.0	-3.2	56.2
14	29°46.5	23°22.7	206°48.3	9.1	-21°44.1	-3.1	56.2
15	44°46.4	23°22.8	221°16.5	9.1	-21°47.1	-2.9	56.1
16	59°46.3	23°22.8	235°44.6	9.1	-21°49.9	-2.8	56.1
17	74°46.1	23°22.9	250°12.7	9.1	-21°52.7	-2.7	56.1
18	89°46.0	23°23.0	264°40.8	9.1	-21°55.3	-2.6	56.1
19	104°45.9	23°23.1	279°09.0	9.1	-21°57.8	-2.5	56.1
20	119°45.7	23°23.1	293°37.1	9.2	-22°00.2	-2.3	56.0
21	134°45.6	23°23.2	308°05.3	9.2	-22°02.5	-2.2	56.0
22	149°45.5	23°23.2	322°33.4	9.2	-22°04.7	-2.1	56.0
23	164°45.3	23°23.3	337°01.6	9.2	-22°06.7	-2.0	56.0
	SD.=15.7	d=0.1			S.D.=15.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:33	22:29	–:–	–:–
62	–:–	–:–	02:10	21:52	–:–	–:–
60	–:–	00:52	02:36	21:26	23:10	–:–
58	–:–	01:41	02:56	21:05	22:21	–:–
56	–:–	02:11	03:13	20:48	21:51	–:–
54	00:48	02:33	03:27	20:34	21:29	23:15
52	01:33	02:51	03:39	20:22	21:11	22:29
50	02:01	03:06	03:50	20:11	20:56	22:01
45	02:46	03:35	04:13	19:49	20:26	21:16
40	03:16	03:58	04:31	19:31	20:04	20:45
35	03:39	04:16	04:46	19:16	19:45	20:22
30	03:58	04:31	04:59	19:03	19:30	20:04
20	04:27	04:56	05:21	18:41	19:05	19:35
10	04:49	05:16	05:39	18:22	18:45	19:12
0	05:08	05:34	05:57	18:04	18:27	18:53
-10	05:25	05:52	06:14	17:47	18:10	18:36
-20	05:41	06:09	06:33	17:28	17:52	18:20
-30	05:58	06:28	06:54	17:07	17:34	18:04
-35	06:07	06:38	07:06	16:55	17:23	17:55
-40	06:16	06:50	07:20	16:41	17:11	17:45
-45	06:26	07:03	07:37	16:24	16:58	17:35
-50	06:38	07:19	07:58	16:03	16:42	17:23
-52	06:43	07:27	08:08	15:53	16:34	17:18
-54	06:49	07:35	08:19	15:42	16:26	17:12
-56	06:55	07:44	08:31	15:30	16:17	17:06
-58	07:02	07:54	08:46	15:15	16:07	16:60
-60	07:09	08:06	09:04	14:58	15:55	16:52

	Moonrise			Moonset		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	–:–	00:18	–:–	–:–
70	21:03	–:–	–:–	00:51	00:24	–:–
68	20:20	22:20	–:–	01:15	01:08	00:57
66	19:51	21:31	22:58	01:34	01:38	01:47
64	19:29	20:60	22:18	01:49	01:60	02:18
62	19:12	20:37	21:50	02:02	02:18	02:42
60	18:58	20:18	21:28	02:13	02:33	03:01
58	18:46	20:03	21:11	02:22	02:46	03:17
56	18:35	19:50	20:56	02:31	02:57	03:30
54	18:26	19:38	20:43	02:38	03:06	03:42
52	18:18	19:28	20:32	02:45	03:15	03:52
50	18:10	19:19	20:22	02:51	03:23	04:01
45	17:54	19:01	20:02	03:04	03:40	04:20
40	17:42	18:45	19:45	03:15	03:53	04:36
35	17:31	18:32	19:31	03:24	04:05	04:50
30	17:21	18:21	19:19	03:32	04:15	05:01
20	17:05	18:02	18:58	03:47	04:33	05:21
10	16:51	17:45	18:39	03:59	04:48	05:39
0	16:38	17:30	18:23	04:11	05:02	05:55
-10	16:24	17:14	18:06	04:22	05:17	06:11
-20	16:10	16:58	17:48	04:35	05:32	06:29
-30	15:55	16:39	17:27	04:49	05:50	06:49
-35	15:45	16:28	17:15	04:58	06:00	07:01
-40	15:35	16:16	17:01	05:07	06:12	07:14
-45	15:23	16:01	16:45	05:18	06:26	07:30
-50	15:08	15:43	16:25	05:32	06:44	07:50
-52	15:01	15:34	16:15	05:38	06:52	07:59
-54	14:54	15:25	16:04	05:46	07:01	08:10
-56	14:45	15:14	15:52	05:53	07:11	08:22
-58	14:35	15:02	15:38	06:02	07:23	08:36
-60	14:25	14:48	15:22	06:13	07:36	08:52

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	00:21	00:27	12:00	22:49	10:24	12(96%)
16	00:34	00:40	12:00	23:42	11:16	13(99%)
17	00:46	00:53	12:00	00:35	12:08	14(100%)

June 18, 19 ,20 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	265°56.7	196°31.6	21°22.6	152°56.4	22°56.5	8°20.7	-22°22.7	335°41.4	-21°46.8
1	280°59.2	211°30.8	21°23.1	167°57.1	22°56.3	23°23.5	-22°22.6	350°44.0	-21°46.8
2	296°01.6	226°30.1	21°23.6	182°57.9	22°56.0	38°26.3	-22°22.6	5°46.6	-21°46.9
3	311°04.1	241°29.3	21°24.1	197°58.7	22°55.8	53°29.1	-22°22.6	20°49.3	-21°46.9
4	326°06.6	256°28.6	21°24.7	212°59.4	22°55.6	68°31.9	-22°22.6	35°51.9	-21°46.9
5	341°09.0	271°27.8	21°25.2	228°00.2	22°55.3	83°34.7	-22°22.6	50°54.6	-21°46.9
6	356°11.5	286°27.0	21°25.7	243°00.9	22°55.1	98°37.5	-22°22.5	65°57.2	-21°47.0
7	11°14.0	301°26.3	21°26.2	258°01.7	22°54.8	113°40.3	-22°22.5	80°59.8	-21°47.0
8	26°16.4	316°25.5	21°26.7	273°02.4	22°54.6	128°43.1	-22°22.5	96°02.5	-21°47.0
9	41°18.9	331°24.7	21°27.2	288°03.2	22°54.3	143°45.9	-22°22.5	111°05.1	-21°47.0
10	56°21.3	346°23.9	21°27.7	303°03.9	22°54.1	158°48.7	-22°22.5	126°07.7	-21°47.1
11	71°23.8	1°23.2	21°28.3	318°04.7	22°53.8	173°51.5	-22°22.4	141°10.4	-21°47.1
12	86°26.3	16°22.4	21°28.8	333°05.4	22°53.6	188°54.3	-22°22.4	156°13.0	-21°47.1
13	101°28.7	31°21.6	21°29.3	348°06.2	22°53.3	203°57.1	-22°22.4	171°15.7	-21°47.1
14	116°31.2	46°20.9	21°29.8	3°06.9	22°53.1	218°59.9	-22°22.4	186°18.3	-21°47.2
15	131°33.7	61°20.1	21°30.3	18°07.7	22°52.8	234°02.7	-22°22.3	201°20.9	-21°47.2
16	146°36.1	76°19.3	21°30.8	33°08.5	22°52.6	249°05.5	-22°22.3	216°23.6	-21°47.2
17	161°38.6	91°18.6	21°31.3	48°09.2	22°52.3	264°08.3	-22°22.3	231°26.2	-21°47.2
18	176°41.1	106°17.8	21°31.8	63°10.0	22°52.1	279°11.1	-22°22.3	246°28.9	-21°47.3
19	191°43.5	121°17.0	21°32.3	78°10.7	22°51.8	294°13.9	-22°22.3	261°31.5	-21°47.3
20	206°46.0	136°16.2	21°32.8	93°11.5	22°51.6	309°16.7	-22°22.2	276°34.1	-21°47.3
21	221°48.5	151°15.5	21°33.3	108°12.2	22°51.3	324°19.5	-22°22.2	291°36.8	-21°47.3
22	236°50.9	166°14.7	21°33.8	123°13.0	22°51.1	339°22.3	-22°22.2	306°39.4	-21°47.4
23	251°53.4	181°13.9	21°34.3	138°13.7	22°50.8	354°25.1	-22°22.2	321°42.0	-21°47.4
Mer.pass.:6:15:		v-0.8 d0.5 m-3.8		v0.8 d-0.2 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.2	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	266°55.8	196°13.2	21°34.8	153°14.5	22°50.5	9°27.9	-22°22.2	336°44.7	-21°47.4
1	281°58.3	211°12.4	21°35.3	168°15.3	22°50.3	24°30.7	-22°22.1	351°47.3	-21°47.4
2	297°00.8	226°11.6	21°35.8	183°16.0	22°50.0	39°33.5	-22°22.1	6°50.0	-21°47.5
3	312°03.2	241°10.8	21°36.3	198°16.8	22°49.8	54°36.3	-22°22.1	21°52.6	-21°47.5
4	327°05.7	256°10.1	21°36.8	213°17.5	22°49.5	69°39.1	-22°22.1	36°55.2	-21°47.5
5	342°08.2	271°09.3	21°37.3	228°18.3	22°49.3	84°41.9	-22°22.1	51°57.9	-21°47.6
6	357°10.6	286°08.5	21°37.8	243°19.0	22°49.0	99°44.7	-22°22.0	67°00.5	-21°47.6
7	12°13.1	301°07.7	21°38.2	258°19.8	22°48.8	114°47.5	-22°22.0	82°03.2	-21°47.6
8	27°15.6	316°06.9	21°38.7	273°20.6	22°48.5	129°50.3	-22°22.0	97°05.8	-21°47.6
9	42°18.0	331°06.2	21°39.2	288°21.3	22°48.3	144°53.1	-22°22.0	112°08.4	-21°47.7
10	57°20.5	346°05.4	21°39.7	303°22.1	22°48.0	159°55.9	-22°21.9	127°11.1	-21°47.7
11	72°23.0	1°04.6	21°40.2	318°22.8	22°47.7	174°58.7	-22°21.9	142°13.7	-21°47.7
12	87°25.4	16°03.8	21°40.7	333°23.6	22°47.5	190°01.5	-22°21.9	157°16.4	-21°47.7
13	102°27.9	31°03.1	21°41.2	348°24.3	22°47.2	205°04.3	-22°21.9	172°19.0	-21°47.8
14	117°30.3	46°02.3	21°41.6	3°25.1	22°47.0	220°07.1	-22°21.9	187°21.6	-21°47.8
15	132°32.8	61°01.5	21°42.1	18°25.9	22°46.7	235°09.9	-22°21.8	202°24.3	-21°47.8
16	147°35.3	76°00.7	21°42.6	33°26.6	22°46.5	250°12.7	-22°21.8	217°26.9	-21°47.8
17	162°37.7	90°59.9	21°43.1	48°27.4	22°46.2	265°15.5	-22°21.8	232°29.6	-21°47.9
18	177°40.2	105°59.2	21°43.6	63°28.1	22°45.9	280°18.3	-22°21.8	247°32.2	-21°47.9
19	192°42.7	120°58.4	21°44.0	78°28.9	22°45.7	295°21.1	-22°21.8	262°34.8	-21°47.9
20	207°45.1	135°57.6	21°44.5	93°29.6	22°45.4	310°23.9	-22°21.7	277°37.5	-21°47.9
21	222°47.6	150°56.8	21°45.0	108°30.4	22°45.2	325°26.7	-22°21.7	292°40.1	-21°48.0
22	237°50.1	165°56.0	21°45.5	123°31.2	22°44.9	340°29.5	-22°21.7	307°42.8	-21°48.0
23	252°52.5	180°55.2	21°45.9	138°31.9	22°44.6	355°32.3	-22°21.7	322°45.4	-21°48.0
Mer.pass.:6:11:		v-0.8 d0.5 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.1	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	267°55.0	195°54.5	21°46.4	153°32.7	22°44.4	10°35.1	-22°21.7	337°48.0	-21°48.0
1	282°57.5	210°53.7	21°46.9	168°33.4	22°44.1	25°37.9	-22°21.6	352°50.7	-21°48.1
2	297°59.9	225°52.9	21°47.3	183°34.2	22°43.9	40°40.7	-22°21.6	7°53.3	-21°48.1
3	313°02.4	240°52.1	21°47.8	198°35.0	22°43.6	55°43.5	-22°21.6	22°56.0	-21°48.1
4	328°04.8	255°51.3	21°48.3	213°35.7	22°43.3	70°46.3	-22°21.6	37°58.6	-21°48.1
5	343°07.3	270°50.5	21°48.8	228°36.5	22°43.1	85°49.1	-22°21.6	53°01.3	-21°48.2
6	358°09.8	285°49.8	21°49.2	243°37.2	22°42.8	100°51.9	-22°21.5	68°03.9	-21°48.2
7	13°12.2	300°49.0	21°49.7	258°38.0	22°42.5	115°54.7	-22°21.5	83°06.5	-21°48.2
8	28°14.7	315°48.2	21°50.1	273°38.8	22°42.3	130°57.5	-22°21.5	98°09.2	-21°48.2
9	43°17.2	330°47.4	21°50.6	288°39.5	22°42.0	146°00.3	-22°21.5	113°11.8	-21°48.3
10	58°19.6	345°46.6	21°51.1	303°40.3	22°41.8	161°03.1	-22°21.4	128°14.5	-21°48.3
11	73°22.1	0°45.8	21°51.5	318°41.0	22°41.5	176°05.9	-22°21.4	143°17.1	-21°48.3
12	88°24.6	15°45.0	21°52.0	333°41.8	22°41.2	191°08.7	-22°21.4	158°19.7	-21°48.3
13	103°27.0	30°44.2	21°52.4	348°42.6	22°41.0	206°11.5	-22°21.4	173°22.4	-21°48.4
14	118°29.5	45°43.5	21°52.9	3°43.3	22°40.7	221°14.3	-22°21.4	188°25.0	-21°48.4
15	133°31.9	60°42.7	21°53.4	18°44.1	22°40.4	236°17.1	-22°21.3	203°27.7	-21°48.4
16	148°34.4	75°41.9	21°53.8	33°44.8	22°40.2	251°19.9	-22°21.3	218°30.3	-21°48.5
17	163°36.9	90°41.1	21°54.3	48°45.6	22°39.9	266°22.7	-22°21.3	233°33.0	-21°48.5
18	178°39.3	105°40.3	21°54.7	63°46.4	22°39.6	281°25.5	-22°21.3	248°35.6	-21°48.5
19	193°41.8	120°39.5	21°55.2	78°47.1	22°39.4	296°28.3	-22°21.3	263°38.2	-21°48.5
20	208°44.3	135°38.7	21°55.6	93°47.9	22°39.1	311°31.0	-22°21.2	278°40.9	-21°48.6
21	223°46.7	150°37.9	21°56.1	108°48.6	22°38.8	326°33.8	-22°21.2	293°43.5	-21°48.6
22	238°49.2	165°37.1	21°56.5	123°49.4	22°38.6	341°36.6	-22°21.2	308°46.2	-21°48.6
23	253°51.7	180°36.3	21°57.0	138°50.2	22°38.3	356°39.4	-22°21.2	323°48.8	-21°48.6
Mer.pass.:6:07:		v-0.8 d0.5 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.1	

Stars

Star	SHA	Dec
Alpheratz	357°39.3	29°11.6
Ankaa	353°11.7	-42°11.9
Schedar	349°36.0	56°38.2
Diphda	348°51.8	-17°52.8
Achernar	335°24.0	-57°08.2
Hamal	327°56.4	23°33.0
Polaris	316°20.0	89°20.4
Akamar	315°15.6	-40°13.6
Menkar	314°11.0	4°09.8
Mirfak	308°34.9	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.5	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°28.0	6°21.9
Elnath	278°07.8	28°37.3
Alnilam	275°42.6	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.5
Sirius	258°30.4	-16°44.5
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.9	-59°34.5
Suhail	222°49.7	-43°30.9
Miaplacidus	221°39.5	-69°48.1
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.8	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.6	-63°12.6
Gacrux	171°56.2	-57°13.5
Alioth	166°17.0	55°51.6
Spica	158°26.8	-11°15.7
Alcaid	152°55.4	49°13.3
Hadar	148°41.7	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.7	-60°55.0
Zubenelg.	137°00.6	-16°07.2
Kochab	137°19.2	74°04.9
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°32.9
Etamin	90°43.7	51°29.3
Kaus Aust.	83°38.0	-34°22.3
Vega	80°35.8	38°48.1
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.2
Peacock	53°12.3	-56°40.1
Deneb	49°28.3	45°20.8
Enif	33°42.9	9°57.8
Alnair	27°38.4	-46°51.8
Fomalhaut	15°19.4	-29°31.0
Scheat	13°49.4	28°11.0
Markab	13°34.2	15°18.4

2019/6/1	SHA	Mer.pass
Venus	290°34.9	10:54
Mars	246°59.7	13:48
Jupiter	102°24.0	23:22
Saturn	69°44.7	01:37

2019/6/1	SHA	Mer.pass
Venus	289°17.3	10:56
Mars	246°18.7	13:46
Jupiter	102°32.1	23:18
Saturn	69°48.8	01:33

2019/6/2	SHA	Mer.pass
Venus	287°59.5	10:57
Mars	245°37.7	13:45
Jupiter	102°40.1	23:13
Saturn	69°53.1	01:29

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°45.2	23°23.4	351°29.8	9.2	-22°08.6	-1.8	55.9
1	194°45.1	23°23.4	5°58.0	9.2	-22°10.4	-1.7	55.9
2	209°44.9	23°23.5	20°26.2	9.2	-22°12.0	-1.6	55.9
3	224°44.8	23°23.6	34°54.5	9.2	-22°13.6	-1.5	55.9
4	239°44.7	23°23.6	49°22.7	9.3	-22°15.0	-1.4	55.9
5	254°44.5	23°23.7	63°51.0	9.3	-22°16.3	-1.2	55.8
6	269°44.4	23°23.7	78°19.2	9.3	-22°17.5	-1.1	55.8
7	284°44.3	23°23.8	92°47.5	9.3	-22°18.6	-1.0	55.8
8	299°44.1	23°23.9	107°15.8	9.3	-22°19.5	-0.9	55.8
9	314°44.0	23°23.9	121°44.2	9.3	-22°20.4	-0.8	55.7
10	329°43.9	23°24.0	136°12.5	9.4	-22°21.1	-0.6	55.7
11	344°43.7	23°24.0	150°40.9	9.4	-22°21.7	-0.5	55.7
12	359°43.6	23°24.1	165°09.3	9.4	-22°22.1	-0.4	55.7
13	14°43.4	23°24.1	179°37.7	9.4	-22°22.5	-0.3	55.7
14	29°43.3	23°24.2	194°06.2	9.5	-22°22.7	-0.2	55.6
15	44°43.2	23°24.2	208°34.7	9.5	-22°22.8	-0.1	55.6
16	59°43.0	23°24.3	223°03.2	9.5	-22°22.8	0.1	55.6
17	74°42.9	23°24.3	237°31.7	9.5	-22°22.7	0.2	55.6
18	89°42.8	23°24.4	252°00.3	9.6	-22°22.5	0.3	55.6
19	104°42.6	23°24.4	266°28.8	9.6	-22°22.1	0.4	55.5
20	119°42.5	23°24.5	280°57.5	9.6	-22°21.6	0.5	55.5
21	134°42.4	23°24.5	295°26.1	9.7	-22°21.0	0.6	55.5
22	149°42.2	23°24.6	309°54.8	9.7	-22°20.3	0.8	55.5
23	164°42.1	23°24.6	324°23.5	9.7	-22°19.5	0.9	55.5
	SD.=15.7	d=0.1			S.D.=15.3		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°42.0	23°24.7	338°52.3	9.8	-22°18.6	1.0	55.4
1	194°41.8	23°24.7	353°21.0	9.8	-22°17.5	1.1	55.4
2	209°41.7	23°24.8	7°49.9	9.8	-22°16.3	1.2	55.4
3	224°41.6	23°24.8	22°18.7	9.9	-22°15.1	1.3	55.4
4	239°41.4	23°24.9	36°47.6	9.9	-22°13.7	1.5	55.4
5	254°41.3	23°24.9	51°16.5	9.9	-22°12.2	1.6	55.3
6	269°41.2	23°24.9	65°45.5	10.0	-22°10.5	1.7	55.3
7	284°41.0	23°25.0	80°14.5	10.0	-22°08.8	1.8	55.3
8	299°40.9	23°25.0	94°43.5	10.1	-22°07.0	1.9	55.3
9	314°40.7	23°25.1	109°12.6	10.1	-22°05.0	2.0	55.3
10	329°40.6	23°25.1	123°41.8	10.1	-22°02.9	2.1	55.2
11	344°40.5	23°25.1	138°10.9	10.2	-22°00.7	2.2	55.2
12	359°40.3	23°25.2	152°40.1	10.2	-21°58.5	2.3	55.2
13	14°40.2	23°25.2	167°09.4	10.3	-21°56.1	2.5	55.2
14	29°40.1	23°25.2	181°38.7	10.3	-21°53.5	2.6	55.2
15	44°39.9	23°25.3	196°08.0	10.4	-21°50.9	2.7	55.1
16	59°39.8	23°25.3	210°37.4	10.4	-21°48.2	2.8	55.1
17	74°39.7	23°25.4	225°06.9	10.5	-21°45.4	2.9	55.1
18	89°39.5	23°25.4	239°36.4	10.5	-21°42.4	3.0	55.1
19	104°39.4	23°25.4	254°05.9	10.6	-21°39.4	3.1	55.1
20	119°39.3	23°25.4	268°35.5	10.6	-21°36.2	3.2	55.0
21	134°39.1	23°25.5	283°05.1	10.6	-21°33.0	3.3	55.0
22	149°39.0	23°25.5	297°34.8	10.7	-21°29.6	3.4	55.0
23	164°38.9	23°25.5	312°04.5	10.7	-21°26.2	3.5	55.0
	SD.=15.7	d=0.0			S.D.=15.1		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°38.7	23°25.6	326°34.3	10.8	-21°22.6	3.6	55.0
1	194°38.6	23°25.6	341°04.1	10.8	-21°18.9	3.7	55.0
2	209°38.5	23°25.6	355°33.9	10.9	-21°15.1	3.8	54.9
3	224°38.3	23°25.7	10°03.9	10.9	-21°11.3	3.9	54.9
4	239°38.2	23°25.7	24°33.8	11.0	-21°07.3	4.0	54.9
5	254°38.0	23°25.7	39°03.9	11.1	-21°03.2	4.1	54.9
6	269°37.9	23°25.7	53°34.0	11.1	-20°59.0	4.2	54.9
7	284°37.8	23°25.8	68°04.1	11.2	-20°54.8	4.3	54.9
8	299°37.6	23°25.8	82°34.3	11.2	-20°50.4	4.4	54.8
9	314°37.5	23°25.8	97°04.5	11.3	-20°45.9	4.5	54.8
10	329°37.4	23°25.8	111°34.8	11.3	-20°41.4	4.6	54.8
11	344°37.2	23°25.8	126°05.2	11.4	-20°36.7	4.7	54.8
12	359°37.1	23°25.9	140°35.6	11.4	-20°31.9	4.8	54.8
13	14°37.0	23°25.9	155°06.0	11.5	-20°27.1	4.9	54.8
14	29°36.8	23°25.9	169°36.5	11.5	-20°22.1	5.0	54.7
15	44°36.7	23°25.9	184°07.1	11.6	-20°17.1	5.1	54.7
16	59°36.6	23°25.9	198°37.7	11.6	-20°12.0	5.2	54.7
17	74°36.4	23°26.0	213°08.4	11.7	-20°06.8	5.3	54.7
18	89°36.3	23°26.0	227°39.1	11.8	-20°01.4	5.4	54.7
19	104°36.1	23°26.0	242°09.9	11.8	-19°56.0	5.5	54.7
20	119°36.0	23°26.0	256°40.7	11.9	-19°50.5	5.5	54.7
21	134°35.9	23°26.0	271°11.6	11.9	-19°44.9	5.6	54.6
22	149°35.7	23°26.0	285°42.6	12.0	-19°39.3	5.7	54.6
23	164°35.6	23°26.0	300°13.6	12.0	-19°33.5	5.8	54.6
	SD.=15.7	d=0.0			S.D.=15.0		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:31	22:32	–:–	–:–
62	–:–	–:–	02:09	21:54	–:–	–:–
60	–:–	00:50	02:36	21:27	23:13	–:–
58	–:–	01:40	02:56	21:07	22:22	–:–
56	–:–	02:10	03:13	20:50	21:53	–:–
54	00:46	02:33	03:27	20:36	21:30	23:18
52	01:32	02:51	03:39	20:23	21:12	22:31
50	02:00	03:06	03:50	20:12	20:57	22:03
45	02:46	03:35	04:13	19:50	20:27	21:17
40	03:16	03:58	04:31	19:32	20:05	20:46
35	03:40	04:16	04:46	19:17	19:46	20:23
30	03:58	04:32	04:59	19:04	19:31	20:04
20	04:27	04:56	05:21	18:42	19:06	19:35
10	04:50	05:17	05:40	18:23	18:46	19:13
0	05:09	05:35	05:58	18:05	18:28	18:54
-10	05:26	05:52	06:15	17:48	18:10	18:37
-20	05:42	06:10	06:34	17:29	17:53	18:21
-30	05:59	06:28	06:55	17:08	17:34	18:04
-35	06:07	06:39	07:07	16:55	17:24	17:55
-40	06:17	06:51	07:21	16:41	17:12	17:46
-45	06:27	07:04	07:38	16:24	16:58	17:35
-50	06:39	07:21	07:59	16:04	16:42	17:24
-52	06:44	07:28	08:09	15:54	16:35	17:18
-54	06:50	07:36	08:20	15:42	16:26	17:13
-56	06:56	07:45	08:33	15:30	16:17	17:06
-58	07:03	07:56	08:48	15:15	16:07	16:60
-60	07:10	08:07	09:05	14:57	15:55	16:52

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:20	–:–	–:–	03:23
66	23:56	–:–	00:22	02:10	03:01	04:20
64	23:14	23:49	–:–	02:50	03:43	04:53
62	22:46	23:24	23:49	03:18	04:11	05:18
60	22:24	23:04	23:33	03:40	04:33	05:37
58	22:06	22:48	23:19	03:58	04:50	05:53
56	21:51	22:34	23:07	04:12	05:05	06:06
54	21:38	22:22	22:57	04:25	05:18	06:18
52	21:27	22:12	22:48	04:36	05:29	06:29
50	21:17	22:02	22:40	04:46	05:39	06:38
45	20:56	21:43	22:22	05:07	06:00	06:57
40	20:39	21:26	22:08	05:24	06:17	07:13
35	20:25	21:13	21:55	05:39	06:31	07:26
30	20:12	21:01	21:45	05:51	06:44	07:38
20	19:51	20:41	21:26	06:12	07:05	07:57
10	19:32	20:23	21:10	06:31	07:23	08:14
0	19:15	20:06	20:55	06:48	07:40	08:30
-10	18:58	19:50	20:40	07:05	07:57	08:46
-20	18:39	19:32	20:24	07:24	08:15	09:03
-30	18:18	19:12	20:06	07:45	08:36	09:22
-35	18:06	18:60	19:55	07:57	08:48	09:34
-40	17:51	18:46	19:43	08:11	09:02	09:47
-45	17:35	18:30	19:28	08:28	09:19	10:02
-50	17:14	18:09	19:10	08:49	09:39	10:20
-52	17:04	17:60	19:02	08:59	09:49	10:29
-54	16:52	17:49	18:52	09:10	09:60	10:39
-56	16:40	17:37	18:41	09:23	10:12	10:50
-58	16:25	17:23	18:29	09:38	10:27	11:03
-60	16:07	17:06	18:15	09:55	10:43	11:18

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	00:59	01:06	12:01	00:35	13:01	15(99%)
19	01:12	01:19	12:01	01:27	13:53	16(95%)
20	01:25	01:32	12:01	02:18	14:42	17(90%)

June 21, 22 ,23 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	268°54.1	195°35.5	21°57.4	153°50.9	22°38.0	11°42.2	-22°21.2	338°51.5	-21°48.7
1	283°56.6	210°34.8	21°57.9	168°51.7	22°37.8	26°45.0	-22°21.1	353°54.1	-21°48.7
2	298°59.1	225°34.0	21°58.3	183°52.5	22°37.5	41°47.8	-22°21.1	8°56.7	-21°48.7
3	314°01.5	240°33.2	21°58.7	198°53.2	22°37.2	56°50.6	-22°21.1	23°59.4	-21°48.7
4	329°04.0	255°32.4	21°59.2	213°54.0	22°37.0	71°53.4	-22°21.1	39°02.0	-21°48.8
5	344°06.4	270°31.6	21°59.6	228°54.7	22°36.7	86°56.2	-22°21.1	54°04.7	-21°48.8
6	359°08.9	285°30.8	22°00.1	243°55.5	22°36.4	101°59.0	-22°21.0	69°07.3	-21°48.8
7	14°11.4	300°30.0	22°00.5	258°56.3	22°36.2	117°01.8	-22°21.0	84°10.0	-21°48.8
8	29°13.8	315°29.2	22°01.0	273°57.0	22°35.9	132°04.6	-22°21.0	99°12.6	-21°48.9
9	44°16.3	330°28.4	22°01.4	288°57.8	22°35.6	147°07.4	-22°21.0	114°15.2	-21°48.9
10	59°18.8	345°27.6	22°01.8	303°58.6	22°35.4	162°10.2	-22°20.9	129°17.9	-21°48.9
11	74°21.2	0°26.8	22°02.3	318°59.3	22°35.1	177°13.0	-22°20.9	144°20.5	-21°48.9
12	89°23.7	15°26.0	22°02.7	334°00.1	22°34.8	192°15.8	-22°20.9	159°23.2	-21°49.0
13	104°26.2	30°25.2	22°03.1	349°00.8	22°34.5	207°18.6	-22°20.9	174°25.8	-21°49.0
14	119°28.6	45°24.4	22°03.6	4°01.6	22°34.3	222°21.4	-22°20.9	189°28.5	-21°49.0
15	134°31.1	60°23.6	22°04.0	19°02.4	22°34.0	237°24.2	-22°20.8	204°31.1	-21°49.1
16	149°33.6	75°22.8	22°04.4	34°03.1	22°33.7	252°27.0	-22°20.8	219°33.8	-21°49.1
17	164°36.0	90°22.0	22°04.8	49°03.9	22°33.5	267°29.8	-22°20.8	234°36.4	-21°49.1
18	179°38.5	105°21.2	22°05.3	64°04.7	22°33.2	282°32.5	-22°20.8	249°39.0	-21°49.1
19	194°40.9	120°20.4	22°05.7	79°05.4	22°32.9	297°35.3	-22°20.8	264°41.7	-21°49.2
20	209°43.4	135°19.6	22°06.1	94°06.2	22°32.6	312°38.1	-22°20.7	279°44.3	-21°49.2
21	224°45.9	150°18.8	22°06.5	109°07.0	22°32.4	327°40.9	-22°20.7	294°47.0	-21°49.2
22	239°48.3	165°18.0	22°07.0	124°07.7	22°32.1	342°43.7	-22°20.7	309°49.6	-21°49.2
23	254°50.8	180°17.2	22°07.4	139°08.5	22°31.8	357°46.5	-22°20.7	324°52.3	-21°49.3
	Mer.pass.:6:03:	v-0.8 d0.4 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.1	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	269°53.3	195°16.4	22°07.8	154°09.3	22°31.5	12°49.3	-22°20.7	339°54.9	-21°49.3
1	284°55.7	210°15.6	22°08.2	169°10.0	22°31.3	27°52.1	-22°20.6	354°57.6	-21°49.3
2	299°58.2	225°14.8	22°08.7	184°10.8	22°31.0	42°54.9	-22°20.6	10°00.2	-21°49.3
3	315°00.7	240°14.0	22°09.1	199°11.6	22°30.7	57°57.7	-22°20.6	25°02.8	-21°49.4
4	330°03.1	255°13.2	22°09.5	214°12.3	22°30.4	73°00.5	-22°20.6	40°05.5	-21°49.4
5	345°05.6	270°12.4	22°09.9	229°13.1	22°30.2	88°03.3	-22°20.6	55°08.1	-21°49.4
6	0°08.1	285°11.6	22°10.3	244°13.8	22°29.9	103°06.1	-22°20.5	70°10.8	-21°49.4
7	15°10.5	300°10.8	22°10.7	259°14.6	22°29.6	118°08.9	-22°20.5	85°13.4	-21°49.5
8	30°13.0	315°10.0	22°11.1	274°15.4	22°29.3	133°11.7	-22°20.5	100°16.1	-21°49.5
9	45°15.4	330°09.2	22°11.6	289°16.1	22°29.1	148°14.4	-22°20.5	115°18.7	-21°49.5
10	60°17.9	345°08.4	22°12.0	304°16.9	22°28.8	163°17.2	-22°20.4	130°21.4	-21°49.5
11	75°20.4	0°07.6	22°12.4	319°17.7	22°28.5	178°20.0	-22°20.4	145°24.0	-21°49.6
12	90°22.8	15°06.8	22°12.8	334°18.4	22°28.2	193°22.8	-22°20.4	160°26.7	-21°49.6
13	105°25.3	30°06.0	22°13.2	349°19.2	22°28.0	208°25.6	-22°20.4	175°29.3	-21°49.6
14	120°27.8	45°05.2	22°13.6	4°20.0	22°27.7	223°28.4	-22°20.4	190°31.9	-21°49.7
15	135°30.2	60°04.4	22°14.0	19°20.7	22°27.4	238°31.2	-22°20.3	205°34.6	-21°49.7
16	150°32.7	75°03.6	22°14.4	34°21.5	22°27.1	253°34.0	-22°20.3	220°37.2	-21°49.7
17	165°35.2	90°02.7	22°14.8	49°22.3	22°26.8	268°36.8	-22°20.3	235°39.9	-21°49.7
18	180°37.6	105°01.9	22°15.2	64°23.0	22°26.6	283°39.6	-22°20.3	250°42.5	-21°49.8
19	195°40.1	120°01.1	22°15.6	79°23.8	22°26.3	298°42.4	-22°20.3	265°45.2	-21°49.8
20	210°42.5	135°00.3	22°16.0	94°24.6	22°26.0	313°45.2	-22°20.2	280°47.8	-21°49.8
21	225°45.0	149°59.5	22°16.4	109°25.3	22°25.7	328°48.0	-22°20.2	295°50.5	-21°49.8
22	240°47.5	164°58.7	22°16.8	124°26.1	22°25.4	343°50.7	-22°20.2	310°53.1	-21°49.9
23	255°49.9	179°57.9	22°17.2	139°26.9	22°25.2	358°53.5	-22°20.2	325°55.8	-21°49.9
	Mer.pass.:5:59:	v-0.8 d0.4 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.1	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	270°52.4	194°57.1	22°17.6	154°27.7	22°24.9	13°56.3	-22°20.2	340°58.4	-21°49.9
1	285°54.9	209°56.3	22°18.0	169°28.4	22°24.6	28°59.1	-22°20.1	356°01.1	-21°49.9
2	300°57.3	224°55.5	22°18.4	184°29.2	22°24.3	44°01.9	-22°20.1	11°03.7	-21°50.0
3	315°59.8	239°54.7	22°18.8	199°30.0	22°24.0	59°04.7	-22°20.1	26°06.3	-21°50.0
4	331°02.3	254°53.8	22°19.2	214°30.7	22°23.8	74°07.5	-22°20.1	41°09.0	-21°50.0
5	346°04.7	269°53.0	22°19.5	229°31.5	22°23.5	89°10.3	-22°20.1	56°11.6	-21°50.0
6	1°07.2	284°52.2	22°19.9	244°32.3	22°23.2	104°13.1	-22°20.0	71°14.3	-21°50.1
7	16°09.7	299°51.4	22°20.3	259°33.0	22°22.9	119°15.9	-22°20.0	86°16.9	-21°50.1
8	31°12.1	314°50.6	22°20.7	274°33.8	22°22.6	134°18.6	-22°20.0	101°19.6	-21°50.1
9	46°14.6	329°49.8	22°21.1	289°34.6	22°22.3	149°21.4	-22°20.0	116°22.2	-21°50.2
10	61°17.0	344°49.0	22°21.5	304°35.3	22°22.1	164°24.2	-22°19.9	131°24.9	-21°50.2
11	76°19.5	359°48.2	22°21.9	319°36.1	22°21.8	179°27.0	-22°19.9	146°27.5	-21°50.2
12	91°22.0	14°47.3	22°22.2	334°36.9	22°21.5	194°29.8	-22°19.9	161°30.2	-21°50.2
13	106°24.4	29°46.5	22°22.6	349°37.6	22°21.2	209°32.6	-22°19.9	176°32.8	-21°50.3
14	121°26.9	44°45.7	22°23.0	4°38.4	22°20.9	224°35.4	-22°19.9	191°35.5	-21°50.3
15	136°29.4	59°44.9	22°23.4	19°39.2	22°20.6	239°38.2	-22°19.8	206°38.1	-21°50.3
16	151°31.8	74°44.1	22°23.8	34°40.0	22°20.4	254°41.0	-22°19.8	221°40.8	-21°50.3
17	166°34.3	89°43.3	22°24.1	49°40.7	22°20.1	269°43.8	-22°19.8	236°43.4	-21°50.4
18	181°36.8	104°42.5	22°24.5	64°41.5	22°19.8	284°46.5	-22°19.8	251°46.1	-21°50.4
19	196°39.2	119°41.6	22°24.9	79°42.3	22°19.5	299°49.3	-22°19.8	266°48.7	-21°50.4
20	211°41.7	134°40.8	22°25.3	94°43.0	22°19.2	314°52.1	-22°19.7	281°51.3	-21°50.4
21	226°44.2	149°40.0	22°25.6	109°43.8	22°18.9	329°54.9	-22°19.7	296°54.0	-21°50.5
22	241°46.6	164°39.2	22°26.0	124°44.6	22°18.6	344°57.7	-22°19.7	311°56.6	-21°50.5
23	256°49.1	179°38.4	22°26.4	139°45.4	22°18.3	0°00.5	-22°19.7	326°59.3	-21°50.5
	Mer.pass.:5:55:	v-0.8 d0.4 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.3	29°11.6
Ankaa	353°11.7	-42°11.9
Schedar	349°35.9	56°38.2
Diphda	348°51.7	-17°52.8
Achernar	335°24.0	-57°08.2
Hamal	327°56.3	23°33.0
Polaris	316°18.9	89°20.4
Akamar	315°15.5	-40°13.6
Menkar	314°11.0	4°09.8
Mirfak	308°34.9	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.3
Alnilam	275°42.6	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.5
Sirius	258°30.4	-16°44.5
Adara	255°09.7	-29°00.1
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.9	-59°34.5
Suhail	222°49.7	-43°30.8
Miaplacidus	221°39.5	-69°48.1
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.8	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.6	-63°12.6
Gacrux	171°56.2	-57°13.5
Alioth	166°17.0	55°51.7
Spica	158°26.8	-11°15.7
Alcaid	152°55.4	49°13.4
Hadar	148°41.7	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.7	-60°55.0
Zubenelg.	137°00.6	-16°07.2
Kochab	137°19.3	74°04.9
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.6
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°32.9
Etamin	90°43.7	51°29.3
Kaus Aust.	83°37.9	-34°22.3
Vega	80°35.8	38°48.1
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.2
Peacock	53°12.3	-56°40.1
Deneb	49°28.3	45°20.9
Enif	33°42.9	9°57.8
Alnair	27°38.4	-46°51.8
Fomalhaut	15°19.4	-29°31.0
Scheat	13°49.3	28°11.1
Markab	13°34.2	15°18.4

2019/6/2	**SHA**	**Mer.pass**
Venus	286°41.4	10:58
Mars	244°56.8	13:44
Jupiter	102°48.1	23:09
Saturn	69°57.3	01:24

2019/6/2	**SHA**	**Mer.pass**
Venus	285°23.2	10:59
Mars	244°16.0	13:43
Jupiter	102°56.0	23:04
Saturn	70°01.6	01:20

2019/6/2	**SHA**	**Mer.pass**
Venus	284°04.7	11:01
Mars	243°35.2	13:41
Jupiter	103°03.9	22:60
Saturn	70°06.0	01:16

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°35.5	23°26.0	314°44.7	12.1	-19°27.7	5.9	54.6
1	194°35.3	23°26.1	329°15.8	12.1	-19°21.7	6.0	54.6
2	209°35.2	23°26.1	343°47.0	12.2	-19°15.7	6.1	54.6
3	224°35.1	23°26.1	358°18.2	12.3	-19°09.6	6.1	54.6
4	239°34.9	23°26.1	12°49.5	12.3	-19°03.4	6.2	54.5
5	254°34.8	23°26.1	27°20.8	12.4	-18°57.1	6.3	54.5
6	269°34.7	23°26.1	41°52.2	12.4	-18°50.8	6.4	54.5
7	284°34.5	23°26.1	56°23.7	12.5	-18°44.3	6.5	54.5
8	299°34.4	23°26.1	70°55.2	12.5	-18°37.8	6.6	54.5
9	314°34.3	23°26.1	85°26.8	12.6	-18°31.2	6.6	54.5
10	329°34.1	23°26.1	99°58.4	12.7	-18°24.5	6.7	54.5
11	344°34.0	23°26.1	114°30.1	12.7	-18°17.8	6.8	54.5
12	359°33.8	23°26.1	129°01.8	12.8	-18°10.9	6.9	54.5
13	14°33.7	23°26.1	143°33.6	12.8	-18°04.0	7.0	54.4
14	29°33.6	23°26.1	158°05.4	12.9	-17°57.0	7.0	54.4
15	44°33.4	23°26.1	172°37.3	12.9	-17°50.0	7.1	54.4
16	59°33.3	23°26.1	187°09.3	13.0	-17°42.8	7.2	54.4
17	74°33.2	23°26.1	201°41.3	13.0	-17°35.6	7.3	54.4
18	89°33.0	23°26.1	216°13.4	13.1	-17°28.3	7.3	54.4
19	104°32.9	23°26.1	230°45.5	13.1	-17°20.9	7.4	54.4
20	119°32.8	23°26.1	245°17.7	13.2	-17°13.5	7.5	54.4
21	134°32.6	23°26.1	259°49.9	13.3	-17°06.0	7.5	54.4
22	149°32.5	23°26.1	274°22.2	13.3	-16°58.4	7.6	54.4
23	164°32.4	23°26.1	288°54.5	13.4	-16°50.7	7.7	54.3
	SD.=15.7	d=0.0			S.D.=14.9		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°32.2	23°26.1	303°26.9	13.4	-16°43.0	7.8	54.3
1	194°32.1	23°26.1	317°59.3	13.5	-16°35.2	7.8	54.3
2	209°32.0	23°26.1	332°31.8	13.5	-16°27.3	7.9	54.3
3	224°31.8	23°26.1	347°04.4	13.6	-16°19.4	8.0	54.3
4	239°31.7	23°26.1	1°37.0	13.6	-16°11.4	8.0	54.3
5	254°31.5	23°26.1	16°09.6	13.7	-16°03.3	8.1	54.3
6	269°31.4	23°26.1	30°42.3	13.7	-15°55.2	8.2	54.3
7	284°31.3	23°26.1	45°15.0	13.8	-15°47.0	8.2	54.3
8	299°31.1	23°26.0	59°47.8	13.8	-15°38.8	8.3	54.3
9	314°31.0	23°26.0	74°20.7	13.9	-15°30.4	8.4	54.3
10	329°30.9	23°26.0	88°53.6	13.9	-15°22.0	8.4	54.3
11	344°30.7	23°26.0	103°26.5	14.0	-15°13.6	8.5	54.3
12	359°30.6	23°26.0	117°59.5	14.0	-15°05.1	8.5	54.3
13	14°30.5	23°26.0	132°32.5	14.1	-14°56.5	8.6	54.2
14	29°30.3	23°26.0	147°05.6	14.1	-14°47.9	8.7	54.2
15	44°30.2	23°25.9	161°38.7	14.2	-14°39.2	8.7	54.2
16	59°30.1	23°25.9	176°11.9	14.2	-14°30.4	8.8	54.2
17	74°29.9	23°25.9	190°45.1	14.2	-14°21.6	8.8	54.2
18	89°29.8	23°25.9	205°18.4	14.3	-14°12.8	8.9	54.2
19	104°29.7	23°25.9	219°51.7	14.3	-14°03.8	9.0	54.2
20	119°29.5	23°25.9	234°25.1	14.4	-13°54.8	9.0	54.2
21	134°29.4	23°25.8	248°58.5	14.4	-13°45.8	9.1	54.2
22	149°29.3	23°25.8	263°31.9	14.5	-13°36.7	9.1	54.2
23	164°29.1	23°25.8	278°05.4	14.5	-13°27.6	9.2	54.2
	SD.=15.7	d=-0.0			S.D.=14.8		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°29.0	23°25.8	292°38.9	14.5	-13°18.4	9.2	54.2
1	194°28.9	23°25.7	307°12.5	14.6	-13°09.1	9.3	54.2
2	209°28.7	23°25.7	321°46.1	14.6	-12°59.8	9.3	54.2
3	224°28.6	23°25.7	336°19.7	14.7	-12°50.5	9.4	54.2
4	239°28.4	23°25.7	350°53.4	14.7	-12°41.1	9.4	54.2
5	254°28.3	23°25.6	5°27.1	14.7	-12°31.6	9.5	54.2
6	269°28.2	23°25.6	20°00.9	14.8	-12°22.1	9.5	54.2
7	284°28.0	23°25.6	34°34.7	14.8	-12°12.5	9.6	54.2
8	299°27.9	23°25.6	49°08.5	14.9	-12°02.9	9.6	54.2
9	314°27.8	23°25.5	63°42.4	14.9	-11°53.3	9.7	54.2
10	329°27.6	23°25.5	78°16.3	14.9	-11°43.6	9.7	54.2
11	344°27.5	23°25.5	92°50.2	15.0	-11°33.8	9.8	54.2
12	359°27.4	23°25.4	107°24.2	15.0	-11°24.0	9.8	54.2
13	14°27.2	23°25.4	121°58.2	15.0	-11°14.2	9.9	54.2
14	29°27.1	23°25.4	136°32.3	15.1	-11°04.3	9.9	54.2
15	44°27.0	23°25.3	151°06.3	15.1	-10°54.4	10.0	54.2
16	59°26.8	23°25.3	165°40.4	15.1	-10°44.4	10.0	54.2
17	74°26.7	23°25.3	180°14.6	15.1	-10°34.4	10.0	54.2
18	89°26.6	23°25.2	194°48.7	15.2	-10°24.3	10.1	54.2
19	104°26.4	23°25.2	209°22.9	15.2	-10°14.2	10.1	54.2
20	119°26.3	23°25.2	223°57.1	15.2	-10°04.1	10.2	54.2
21	134°26.2	23°25.1	238°31.4	15.3	-9°53.9	10.2	54.2
22	149°26.0	23°25.1	253°05.7	15.3	-9°43.7	10.2	54.2
23	164°25.9	23°25.0	267°40.0	15.3	-9°33.4	10.3	54.2
	SD.=15.7	d=-0.0			S.D.=14.8		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:31	22:32	–:–	–:–
62	–:–	–:–	02:10	21:54	–:–	–:–
60	–:–	00:49	02:36	21:28	23:14	–:–
58	–:–	01:41	02:57	21:07	22:23	–:–
56	–:–	02:11	03:13	20:50	21:53	–:–
54	00:45	02:33	03:28	20:36	21:31	23:18
52	01:33	02:51	03:40	20:24	21:13	22:31
50	02:00	03:06	03:51	20:13	20:58	22:03
45	02:46	03:36	04:13	19:50	20:28	21:18
40	03:17	03:59	04:32	19:32	20:05	20:47
35	03:40	04:17	04:47	19:17	19:47	20:24
30	03:59	04:32	04:60	19:04	19:32	20:05
20	04:28	04:57	05:22	18:42	19:07	19:36
10	04:51	05:18	05:41	18:23	18:46	19:13
0	05:10	05:36	05:58	18:06	18:28	18:54
-10	05:27	05:53	06:16	17:48	18:11	18:37
-20	05:43	06:10	06:34	17:30	17:54	18:21
-30	05:59	06:29	06:56	17:08	17:35	18:05
-35	06:08	06:40	07:08	16:56	17:24	17:56
-40	06:17	06:52	07:22	16:42	17:12	17:46
-45	06:28	07:05	07:39	16:25	16:59	17:36
-50	06:40	07:21	07:60	16:04	16:43	17:24
-52	06:45	07:29	08:10	15:54	16:35	17:19
-54	06:51	07:37	08:21	15:43	16:27	17:13
-56	06:57	07:46	08:34	15:30	16:18	17:07
-58	07:04	07:56	08:48	15:16	16:08	17:00
-60	07:11	08:08	09:06	14:58	15:56	16:53

Lat.	Moonrise			Moonset		
	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	02:14	01:36	–:–	05:48	07:57
70	02:04	01:29	01:12	04:21	06:31	08:20
68	01:07	00:60	00:54	05:17	07:00	08:37
66	00:33	00:37	00:39	05:50	07:21	08:51
64	00:08	00:19	00:26	06:14	07:38	09:02
62	–:–	00:05	00:16	06:33	07:52	09:12
60	23:52	–:–	00:07	06:49	08:04	09:20
58	23:42	23:59	–:–	07:02	08:14	09:27
56	23:32	23:52	–:–	07:13	08:23	09:33
54	23:24	23:46	–:–	07:23	08:31	09:39
52	23:17	23:40	–:–	07:32	08:38	09:44
50	23:10	23:35	23:57	07:40	08:44	09:49
45	22:55	23:24	23:49	07:57	08:58	09:58
40	22:43	23:15	23:43	08:10	09:09	10:07
35	22:33	23:07	23:38	08:22	09:18	10:14
30	22:24	22:60	23:33	08:32	09:26	10:20
20	22:09	22:48	23:24	08:49	09:40	10:30
10	21:55	22:37	23:17	09:04	09:53	10:39
0	21:42	22:27	23:10	09:18	10:04	10:48
-10	21:30	22:17	23:03	09:32	10:16	10:56
-20	21:16	22:06	22:56	09:47	10:28	11:05
-30	21:00	21:54	22:47	10:04	10:42	11:16
-35	20:51	21:47	22:42	10:14	10:49	11:22
-40	20:41	21:39	22:36	10:25	10:59	11:28
-45	20:28	21:29	22:30	10:38	11:09	11:36
-50	20:13	21:18	22:22	10:54	11:22	11:45
-52	20:06	21:12	22:18	11:01	11:28	11:49
-54	19:58	21:06	22:14	11:10	11:34	11:54
-56	19:50	20:60	22:10	11:19	11:41	11:59
-58	19:40	20:52	22:05	11:29	11:49	12:05
-60	19:28	20:44	21:59	11:41	11:59	12:11

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	01:38	01:45	12:01	03:07	15:30	18(84%)
22	01:51	01:58	12:01	03:53	16:15	19(76%)
23	02:04	02:11	12:02	04:37	16:59	20(68%)

June 24, 25 ,26 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	271°51.5	194°37.6	22°26.7	154°46.1	22°18.1	15°03.3	-22°19.7	342°01.9	-21°50.6
1	286°54.0	209°36.7	22°27.1	169°46.9	22°17.8	30°06.1	-22°19.6	357°04.6	-21°50.6
2	301°56.5	224°35.9	22°27.5	184°47.7	22°17.5	45°08.8	-22°19.6	12°07.2	-21°50.6
3	316°58.9	239°35.1	22°27.8	199°48.4	22°17.2	60°11.6	-22°19.6	27°09.9	-21°50.6
4	332°01.4	254°34.3	22°28.2	214°49.2	22°16.9	75°14.4	-22°19.6	42°12.5	-21°50.7
5	347°03.9	269°33.5	22°28.6	229°50.0	22°16.6	90°17.2	-22°19.6	57°15.2	-21°50.7
6	2°06.3	284°32.6	22°28.9	244°50.8	22°16.3	105°20.0	-22°19.5	72°17.8	-21°50.7
7	17°08.8	299°31.8	22°29.3	259°51.5	22°16.0	120°22.8	-22°19.5	87°20.5	-21°50.7
8	32°11.3	314°31.0	22°29.6	274°52.3	22°15.7	135°25.6	-22°19.5	102°23.1	-21°50.8
9	47°13.7	329°30.2	22°30.0	289°53.1	22°15.5	150°28.4	-22°19.5	117°25.8	-21°50.8
10	62°16.2	344°29.4	22°30.4	304°53.8	22°15.2	165°31.1	-22°19.4	132°28.4	-21°50.8
11	77°18.6	359°28.5	22°30.7	319°54.6	22°14.9	180°33.9	-22°19.4	147°31.1	-21°50.8
12	92°21.1	14°27.7	22°31.1	334°55.4	22°14.6	195°36.7	-22°19.4	162°33.7	-21°50.9
13	107°23.6	29°26.9	22°31.4	349°56.2	22°14.3	210°39.5	-22°19.4	177°36.4	-21°50.9
14	122°26.0	44°26.1	22°31.8	4°56.9	22°14.0	225°42.3	-22°19.4	192°39.0	-21°50.9
15	137°28.5	59°25.3	22°32.1	19°57.7	22°13.7	240°45.1	-22°19.3	207°41.7	-21°50.9
16	152°31.0	74°24.4	22°32.5	34°58.5	22°13.4	255°47.9	-22°19.3	222°44.3	-21°51.0
17	167°33.4	89°23.6	22°32.8	49°59.3	22°13.1	270°50.6	-22°19.3	237°47.0	-21°51.0
18	182°35.9	104°22.8	22°33.2	65°00.0	22°12.8	285°53.4	-22°19.3	252°49.6	-21°51.0
19	197°38.4	119°22.0	22°33.5	80°00.8	22°12.5	300°56.2	-22°19.3	267°52.3	-21°51.1
20	212°40.8	134°21.1	22°33.9	95°01.6	22°12.3	315°59.0	-22°19.2	282°54.9	-21°51.1
21	227°43.3	149°20.3	22°34.2	110°02.3	22°12.0	331°01.8	-22°19.2	297°57.6	-21°51.1
22	242°45.8	164°19.5	22°34.6	125°03.1	22°11.7	346°04.6	-22°19.2	313°00.2	-21°51.1
23	257°48.2	179°18.7	22°34.9	140°03.9	22°11.4	1°07.4	-22°19.2	328°02.9	-21°51.2
Mer.pass.:5:51:		v-0.8 d0.4 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.1	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	272°50.7	194°17.8	22°35.3	155°04.7	22°11.1	16°10.1	-22°19.2	343°05.5	-21°51.2
1	287°53.1	209°17.0	22°35.6	170°05.4	22°10.8	31°12.9	-22°19.1	358°08.2	-21°51.2
2	302°55.6	224°16.2	22°35.9	185°06.2	22°10.5	46°15.7	-22°19.1	13°10.8	-21°51.2
3	317°58.1	239°15.4	22°36.3	200°07.0	22°10.2	61°18.5	-22°19.1	28°13.5	-21°51.3
4	333°00.5	254°14.5	22°36.6	215°07.8	22°09.9	76°21.3	-22°19.1	43°16.1	-21°51.3
5	348°03.0	269°13.7	22°36.9	230°08.5	22°09.6	91°24.1	-22°19.1	58°18.8	-21°51.3
6	3°05.5	284°12.9	22°37.3	245°09.3	22°09.3	106°26.9	-22°19.0	73°21.4	-21°51.3
7	18°07.9	299°12.1	22°37.6	260°10.1	22°09.0	121°29.6	-22°19.0	88°24.1	-21°51.4
8	33°10.4	314°11.2	22°37.9	275°10.9	22°08.7	136°32.4	-22°19.0	103°26.7	-21°51.4
9	48°12.9	329°10.4	22°38.3	290°11.6	22°08.4	151°35.2	-22°19.0	118°29.4	-21°51.4
10	63°15.3	344°09.6	22°38.6	305°12.4	22°08.1	166°38.0	-22°18.9	133°32.0	-21°51.5
11	78°17.8	359°08.7	22°38.9	320°13.2	22°07.8	181°40.8	-22°18.9	148°34.7	-21°51.5
12	93°20.2	14°07.9	22°39.3	335°14.0	22°07.5	196°43.6	-22°18.9	163°37.3	-21°51.5
13	108°22.7	29°07.1	22°39.6	350°14.7	22°07.2	211°46.3	-22°18.9	178°40.0	-21°51.5
14	123°25.2	44°06.3	22°39.9	5°15.5	22°06.9	226°49.1	-22°18.9	193°42.6	-21°51.6
15	138°27.6	59°05.4	22°40.2	20°16.3	22°06.6	241°51.9	-22°18.8	208°45.3	-21°51.6
16	153°30.1	74°04.6	22°40.6	35°17.1	22°06.3	256°54.7	-22°18.8	223°47.9	-21°51.6
17	168°32.6	89°03.8	22°40.9	50°17.9	22°06.0	271°57.5	-22°18.8	238°50.6	-21°51.6
18	183°35.0	104°02.9	22°41.2	65°18.6	22°05.7	287°00.3	-22°18.8	253°53.2	-21°51.7
19	198°37.5	119°02.1	22°41.5	80°19.4	22°05.4	302°03.0	-22°18.8	268°55.9	-21°51.7
20	213°40.0	134°01.3	22°41.9	95°20.2	22°05.1	317°05.8	-22°18.7	283°58.5	-21°51.7
21	228°42.4	149°00.5	22°42.2	110°21.0	22°04.8	332°08.6	-22°18.7	299°01.2	-21°51.7
22	243°44.9	163°59.6	22°42.5	125°21.7	22°04.5	347°11.4	-22°18.7	314°03.8	-21°51.8
23	258°47.4	178°58.8	22°42.8	140°22.5	22°04.2	2°14.2	-22°18.7	329°06.5	-21°51.8
Mer.pass.:5:47:		v-0.8 d0.3 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.6 d-0.0 m0.1	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	273°49.8	193°58.0	22°43.1	155°23.3	22°03.9	17°16.9	-22°18.7	344°09.1	-21°51.8
1	288°52.3	208°57.1	22°43.4	170°24.1	22°03.6	32°19.7	-22°18.6	359°11.8	-21°51.9
2	303°54.7	223°56.3	22°43.8	185°24.8	22°03.3	47°22.5	-22°18.6	14°14.4	-21°51.9
3	318°57.2	238°55.5	22°44.1	200°25.6	22°03.0	62°25.3	-22°18.6	29°17.1	-21°51.9
4	333°59.7	253°54.6	22°44.4	215°26.4	22°02.7	77°28.1	-22°18.6	44°19.7	-21°51.9
5	349°02.1	268°53.8	22°44.7	230°27.2	22°02.4	92°30.8	-22°18.6	59°22.4	-21°52.0
6	4°04.6	283°53.0	22°45.0	245°28.0	22°02.1	107°33.6	-22°18.5	74°25.0	-21°52.0
7	19°07.1	298°52.1	22°45.3	260°28.7	22°01.8	122°36.4	-22°18.5	89°27.7	-21°52.0
8	34°09.5	313°51.3	22°45.6	275°29.5	22°01.5	137°39.2	-22°18.5	104°30.3	-21°52.0
9	49°12.0	328°50.5	22°45.9	290°30.3	22°01.2	152°42.0	-22°18.5	119°33.0	-21°52.1
10	64°14.5	343°49.6	22°46.2	305°31.1	22°00.9	167°44.7	-22°18.5	134°35.6	-21°52.1
11	79°16.9	358°48.8	22°46.5	320°31.8	22°00.6	182°47.5	-22°18.4	149°38.3	-21°52.1
12	94°19.4	13°47.9	22°46.8	335°32.6	22°00.3	197°50.3	-22°18.4	164°40.9	-21°52.1
13	109°21.9	28°47.1	22°47.1	350°33.4	21°60.0	212°53.1	-22°18.4	179°43.6	-21°52.2
14	124°24.3	43°46.3	22°47.4	5°34.2	21°59.7	227°55.9	-22°18.4	194°46.2	-21°52.2
15	139°26.8	58°45.4	22°47.7	20°35.0	21°59.4	242°58.6	-22°18.4	209°48.9	-21°52.2
16	154°29.2	73°44.6	22°48.0	35°35.7	21°59.1	258°01.4	-22°18.3	224°51.5	-21°52.3
17	169°31.7	88°43.8	22°48.3	50°36.5	21°58.8	273°04.2	-22°18.3	239°54.2	-21°52.3
18	184°34.2	103°42.9	22°48.6	65°37.3	21°58.5	288°07.0	-22°18.3	254°56.9	-21°52.3
19	199°36.6	118°42.1	22°48.9	80°38.1	21°58.2	303°09.8	-22°18.3	269°59.5	-21°52.3
20	214°39.1	133°41.3	22°49.2	95°38.9	21°57.9	318°12.5	-22°18.2	285°02.2	-21°52.4
21	229°41.6	148°40.4	22°49.5	110°39.6	21°57.5	333°15.3	-22°18.2	300°04.8	-21°52.4
22	244°44.0	163°39.6	22°49.8	125°40.4	21°57.2	348°18.1	-22°18.2	315°07.5	-21°52.4
23	259°46.5	178°38.7	22°50.1	140°41.2	21°56.9	3°20.9	-22°18.2	330°10.1	-21°52.4
Mer.pass.:5:43:		v-0.8 d0.3 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.5		v2.7 d-0.0 m0.1	

Stars

	SHA	Dec
Alpheratz	357°39.3	29°11.6
Ankaa	353°11.7	-42°11.9
Schedar	349°35.9	56°38.2
Diphda	348°51.7	-17°52.8
Achernar	335°24.0	-57°08.1
Hamal	327°56.3	23°33.0
Polaris	316°17.8	89°20.4
Akamar	315°15.5	-40°13.6
Menkar	314°11.0	4°09.8
Mirfak	308°34.9	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.5
Sirius	258°30.4	-16°44.5
Adara	255°09.7	-29°00.0
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°16.9	-59°34.5
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.6	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.9	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.7	-63°12.6
Gacrux	171°56.3	-57°13.5
Alioth	166°17.0	55°51.7
Spica	158°26.8	-11°15.7
Alcaid	152°55.4	49°13.4
Hadar	148°41.7	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.6	19°05.4
Rigil Kent.	139°45.7	-60°55.0
Zubenelg.	137°00.6	-16°07.2
Kochab	137°19.3	74°04.9
Alphecca	126°07.2	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°32.9
Etamin	90°43.7	51°29.3
Kaus Aust.	83°37.9	-34°22.3
Vega	80°35.8	38°48.1
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.2
Peacock	53°12.3	-56°40.1
Deneb	49°28.3	45°20.9
Enif	33°42.9	9°57.8
Alnair	27°38.3	-46°51.8
Fomalhaut	15°19.4	-29°31.0
Scheat	13°49.3	28°11.1
Markab	13°34.2	15°18.5

2019/6/2	SHA	Mer.pass
Venus	282°46.0	11:02
Mars	242°54.6	13:40
Jupiter	103°11.7	22:56
Saturn	70°10.4	01:12

2019/6/2	SHA	Mer.pass
Venus	281°27.2	11:03
Mars	242°14.0	13:39
Jupiter	103°19.5	22:51
Saturn	70°14.8	01:07

2019/6/2	SHA	Mer.pass
Venus	280°08.1	11:05
Mars	241°33.5	13:38
Jupiter	103°27.1	22:47
Saturn	70°19.3	01:03

Horizontal paralax

Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°25.8	23°25.0	282°14.3	15.3	-9°23.1	10.3	54.2
1	194°25.6	23°25.0	296°48.6	15.4	-9°12.8	10.4	54.2
2	209°25.5	23°24.9	311°23.0	15.4	-9°02.4	10.4	54.2
3	224°25.4	23°24.9	325°57.4	15.4	-8°52.0	10.4	54.3
4	239°25.2	23°24.8	340°31.8	15.4	-8°41.5	10.5	54.3
5	254°25.1	23°24.8	355°06.2	15.4	-8°31.0	10.5	54.3
6	269°25.0	23°24.8	9°40.7	15.5	-8°20.5	10.5	54.3
7	284°24.8	23°24.7	24°15.2	15.5	-8°10.0	10.6	54.3
8	299°24.7	23°24.7	38°49.7	15.5	-7°59.4	10.6	54.3
9	314°24.5	23°24.6	53°24.2	15.5	-7°48.7	10.6	54.3
10	329°24.4	23°24.6	67°58.7	15.5	-7°38.1	10.7	54.3
11	344°24.3	23°24.5	82°33.3	15.6	-7°27.4	10.7	54.3
12	359°24.1	23°24.5	97°07.8	15.6	-7°16.7	10.7	54.3
13	14°24.0	23°24.4	111°42.4	15.6	-7°05.9	10.8	54.3
14	29°23.9	23°24.4	126°17.0	15.6	-6°55.1	10.8	54.3
15	44°23.7	23°24.3	140°51.6	15.6	-6°44.3	10.8	54.3
16	59°23.6	23°24.3	155°26.2	15.6	-6°33.5	10.9	54.3
17	74°23.5	23°24.2	170°00.9	15.6	-6°22.6	10.9	54.4
18	89°23.3	23°24.2	184°35.5	15.6	-6°11.7	10.9	54.4
19	104°23.2	23°24.1	199°10.1	15.7	-6°00.8	10.9	54.4
20	119°23.1	23°24.1	213°44.8	15.7	-5°49.8	11.0	54.4
21	134°22.9	23°24.0	228°19.5	15.7	-5°38.8	11.0	54.4
22	149°22.8	23°24.0	242°54.1	15.7	-5°27.8	11.0	54.4
23	164°22.7	23°23.9	257°28.8	15.7	-5°16.8	11.0	54.4
	SD.=15.7	d=-0.0			S.D.=14.8		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°22.5	23°23.8	272°03.5	15.7	-5°05.7	11.1	54.4
1	194°22.4	23°23.8	286°38.2	15.7	-4°54.6	11.1	54.4
2	209°22.3	23°23.7	301°12.9	15.7	-4°43.5	11.1	54.5
3	224°22.1	23°23.7	315°47.6	15.7	-4°32.4	11.1	54.5
4	239°22.0	23°23.6	330°22.3	15.7	-4°21.2	11.2	54.5
5	254°21.9	23°23.5	344°57.0	15.7	-4°10.1	11.2	54.5
6	269°21.7	23°23.5	359°31.7	15.7	-3°58.9	11.2	54.5
7	284°21.6	23°23.4	14°06.4	15.7	-3°47.7	11.2	54.5
8	299°21.5	23°23.4	28°41.1	15.7	-3°36.4	11.2	54.5
9	314°21.3	23°23.3	43°15.7	15.7	-3°25.2	11.3	54.5
10	329°21.2	23°23.2	57°50.4	15.7	-3°13.9	11.3	54.6
11	344°21.1	23°23.2	72°25.1	15.7	-3°02.6	11.3	54.6
12	359°20.9	23°23.1	86°59.8	15.7	-2°51.3	11.3	54.6
13	14°20.8	23°23.0	101°34.5	15.7	-2°39.9	11.3	54.6
14	29°20.7	23°23.0	116°09.1	15.7	-2°28.6	11.4	54.6
15	44°20.5	23°22.9	130°43.8	15.7	-2°17.2	11.4	54.6
16	59°20.4	23°22.8	145°18.4	15.6	-2°05.8	11.4	54.7
17	74°20.3	23°22.8	159°53.1	15.6	-1°54.4	11.4	54.7
18	89°20.2	23°22.7	174°27.7	15.6	-1°43.0	11.4	54.7
19	104°20.0	23°22.6	189°02.3	15.6	-1°31.6	11.4	54.7
20	119°19.9	23°22.5	203°36.9	15.6	-1°20.2	11.4	54.7
21	134°19.8	23°22.5	218°11.5	15.6	-1°08.7	11.5	54.7
22	149°19.6	23°22.4	232°46.1	15.6	-0°57.2	11.5	54.8
23	164°19.5	23°22.3	247°20.6	15.5	-0°45.8	11.5	54.8
	SD.=15.7	d=-0.1			S.D.=14.8		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°19.4	23°22.3	261°55.2	15.5	-0°34.3	11.5	54.8
1	194°19.2	23°22.2	276°29.7	15.5	-0°22.8	11.5	54.8
2	209°19.1	23°22.1	291°04.2	15.5	-0°11.3	11.5	54.8
3	224°19.0	23°22.0	305°38.7	15.5	0°00.2	11.5	54.9
4	239°18.8	23°21.9	320°13.1	15.5	0°11.8	11.5	54.9
5	254°18.7	23°21.9	334°47.6	15.4	0°23.3	11.5	54.9
6	269°18.6	23°21.8	349°22.0	15.4	0°34.8	11.5	54.9
7	284°18.4	23°21.7	3°56.4	15.4	0°46.4	11.5	54.9
8	299°18.3	23°21.6	18°30.7	15.4	0°57.9	11.6	55.0
9	314°18.2	23°21.6	33°05.1	15.3	1°09.5	11.6	55.0
10	329°18.0	23°21.5	47°39.4	15.3	1°21.1	11.6	55.0
11	344°17.9	23°21.4	62°13.7	15.3	1°32.6	11.6	55.0
12	359°17.8	23°21.3	76°48.0	15.2	1°44.2	11.6	55.0
13	14°17.6	23°21.2	91°22.2	15.2	1°55.8	11.6	55.1
14	29°17.5	23°21.1	105°56.4	15.2	2°07.3	11.6	55.1
15	44°17.4	23°21.1	120°30.6	15.2	2°18.9	11.6	55.1
16	59°17.2	23°21.0	135°04.7	15.1	2°30.5	11.6	55.1
17	74°17.1	23°20.9	149°38.8	15.1	2°42.1	11.6	55.2
18	89°17.0	23°20.8	164°12.9	15.1	2°53.6	11.6	55.2
19	104°16.9	23°20.7	178°46.9	15.0	3°05.2	11.6	55.2
20	119°16.7	23°20.6	193°20.9	15.0	3°16.8	11.6	55.2
21	134°16.6	23°20.5	207°54.9	14.9	3°28.3	11.6	55.2
22	149°16.5	23°20.4	222°28.8	14.9	3°39.9	11.6	55.3
23	164°16.3	23°20.4	237°02.7	14.9	3°51.5	11.6	55.3
	SD.=15.7	d=-0.1			S.D.=14.9		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:33	22:32	–:–	–:–
62	–:–	–:–	02:11	21:54	–:–	–:–
60	–:–	00:52	02:37	21:28	23:13	–:–
58	–:–	01:42	02:58	21:07	22:23	–:–
56	–:–	02:12	03:14	20:51	21:53	–:–
54	00:47	02:34	03:29	20:36	21:31	23:17
52	01:34	02:52	03:41	20:24	21:13	22:31
50	02:02	03:07	03:52	20:13	20:58	22:03
45	02:47	03:37	04:14	19:51	20:28	21:18
40	03:18	03:59	04:32	19:33	20:06	20:47
35	03:41	04:18	04:47	19:18	19:48	20:24
30	03:60	04:33	05:00	19:05	19:32	20:06
20	04:29	04:58	05:22	18:43	19:07	19:37
10	04:51	05:18	05:41	18:24	18:47	19:14
0	05:10	05:36	05:59	18:06	18:29	18:55
-10	05:27	05:54	06:16	17:49	18:12	18:38
-20	05:43	06:11	06:35	17:30	17:54	18:22
-30	05:60	06:30	06:56	17:09	17:36	18:05
-35	06:09	06:40	07:08	16:57	17:25	17:57
-40	06:18	06:52	07:23	16:43	17:13	17:47
-45	06:28	07:06	07:39	16:26	16:60	17:37
-50	06:40	07:22	08:00	16:05	16:44	17:25
-52	06:45	07:29	08:10	15:55	16:36	17:20
-54	06:51	07:37	08:21	15:44	16:28	17:14
-56	06:57	07:46	08:34	15:31	16:19	17:08
-58	07:04	07:57	08:49	15:17	16:09	17:01
-60	07:11	08:08	09:06	14:59	15:57	16:54

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	01:14	00:56	00:40	09:49	11:34	13:18
70	00:60	00:49	00:39	10:01	11:38	13:16
68	00:49	00:44	00:39	10:10	11:42	13:13
66	00:39	00:39	00:38	10:18	11:45	13:12
64	00:31	00:35	00:38	10:25	11:47	13:10
62	00:24	00:31	00:38	10:30	11:49	13:09
60	00:18	00:28	00:37	10:35	11:51	13:07
58	00:13	00:25	00:37	10:40	11:53	13:06
56	00:09	00:23	00:37	10:44	11:54	13:06
54	00:04	00:21	00:37	10:47	11:55	13:05
52	00:01	00:19	00:36	10:50	11:57	13:04
50	–:–	00:17	00:36	10:53	11:58	13:03
45	–:–	00:13	00:36	10:59	12:00	13:02
40	–:–	00:10	00:35	11:04	12:02	13:00
35	–:–	00:07	00:35	11:09	12:04	12:59
30	–:–	00:04	00:35	11:12	12:05	12:58
20	23:60	–:–	00:34	11:19	12:08	12:57
10	23:56	–:–	00:34	11:25	12:10	12:55
0	23:52	–:–	00:34	11:30	12:12	12:54
-10	23:48	–:–	00:33	11:36	12:14	12:53
-20	23:44	–:–	00:33	11:41	12:16	12:51
-30	23:40	–:–	00:33	11:48	12:19	12:49
-35	23:37	–:–	00:32	11:51	12:20	12:48
-40	23:34	–:–	00:32	11:56	12:21	12:47
-45	23:31	–:–	00:32	12:00	12:23	12:46
-50	23:26	–:–	00:32	12:06	12:25	12:44
-52	23:25	–:–	00:31	12:09	12:26	12:44
-54	23:22	–:–	00:31	12:11	12:27	12:43
-56	23:20	–:–	00:31	12:15	12:29	12:42
-58	23:18	–:–	00:31	12:18	12:30	12:41
-60	23:15	–:–	00:31	12:22	12:31	12:40

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	02:17	02:23	12:02	05:20	17:41	21(59%)
25	02:30	02:36	12:02	06:01	18:22	22(49%)
26	02:43	02:49	12:02	06:43	19:05	23(40%)

June 27, 28 ,29 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	274°49.0	193°37.9	22°50.3	155°42.0	21°56.6	18°23.7	-22°18.2	345°12.8	-21°52.5
1	289°51.4	208°37.1	22°50.6	170°42.8	21°56.3	33°26.4	-22°18.1	0°15.4	-21°52.5
2	304°53.9	223°36.2	22°50.9	185°43.5	21°56.0	48°29.2	-22°18.1	15°18.1	-21°52.5
3	319°56.3	238°35.4	22°51.2	200°44.3	21°55.7	63°32.0	-22°18.1	30°20.7	-21°52.6
4	334°58.8	253°34.5	22°51.5	215°45.1	21°55.4	78°34.8	-22°18.1	45°23.4	-21°52.6
5	350°01.3	268°33.7	22°51.8	230°45.9	21°55.1	93°37.5	-22°18.1	60°26.0	-21°52.6
6	5°03.7	283°32.9	22°52.1	245°46.7	21°54.8	108°40.3	-22°18.0	75°28.7	-21°52.6
7	20°06.2	298°32.0	22°52.3	260°47.5	21°54.5	123°43.1	-22°18.0	90°31.3	-21°52.7
8	35°08.7	313°31.2	22°52.6	275°48.2	21°54.2	138°45.9	-22°18.0	105°34.0	-21°52.7
9	50°11.1	328°30.3	22°52.9	290°49.0	21°53.8	153°48.6	-22°18.0	120°36.6	-21°52.7
10	65°13.6	343°29.5	22°53.2	305°49.8	21°53.5	168°51.4	-22°18.0	135°39.3	-21°52.7
11	80°16.1	358°28.7	22°53.4	320°50.6	21°53.2	183°54.2	-22°17.9	150°41.9	-21°52.8
12	95°18.5	13°27.8	22°53.7	335°51.4	21°52.9	198°57.0	-22°17.9	165°44.6	-21°52.8
13	110°21.0	28°27.0	22°54.0	350°52.1	21°52.6	213°59.8	-22°17.9	180°47.3	-21°52.8
14	125°23.5	43°26.1	22°54.3	5°52.9	21°52.3	229°02.5	-22°17.9	195°49.9	-21°52.8
15	140°25.9	58°25.3	22°54.5	20°53.7	21°52.0	244°05.3	-22°17.9	210°52.6	-21°52.9
16	155°28.4	73°24.4	22°54.8	35°54.5	21°51.7	259°08.1	-22°17.8	225°55.2	-21°52.9
17	170°30.8	88°23.6	22°55.1	50°55.3	21°51.4	274°10.9	-22°17.8	240°57.9	-21°52.9
18	185°33.3	103°22.8	22°55.3	65°56.1	21°51.0	289°13.6	-22°17.8	256°00.5	-21°53.0
19	200°35.8	118°21.9	22°55.6	80°56.8	21°50.7	304°16.4	-22°17.8	271°03.2	-21°53.0
20	215°38.2	133°21.1	22°55.9	95°57.6	21°50.4	319°19.2	-22°17.8	286°05.8	-21°53.0
21	230°40.7	148°20.2	22°56.1	110°58.4	21°50.1	334°22.0	-22°17.7	301°08.5	-21°53.0
22	245°43.2	163°19.4	22°56.4	125°59.2	21°49.8	349°24.7	-22°17.7	316°11.1	-21°53.1
23	260°45.6	178°18.5	22°56.7	140°60.0	21°49.5	4°27.5	-22°17.7	331°13.8	-21°53.1
Mer.pass.:5:39:		v-0.8 d0.3 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	275°48.1	193°17.7	22°56.9	156°00.8	21°49.2	19°30.3	-22°17.7	346°16.4	-21°53.1
1	290°50.6	208°16.9	22°57.2	171°01.5	21°48.8	34°33.1	-22°17.7	1°19.1	-21°53.1
2	305°53.0	223°16.0	22°57.4	186°02.3	21°48.5	49°35.8	-22°17.6	16°21.7	-21°53.2
3	320°55.5	238°15.2	22°57.7	201°03.1	21°48.2	64°38.6	-22°17.6	31°24.4	-21°53.2
4	335°58.0	253°14.3	22°58.0	216°03.9	21°47.9	79°41.4	-22°17.6	46°27.1	-21°53.2
5	351°00.4	268°13.5	22°58.2	231°04.7	21°47.6	94°44.1	-22°17.6	61°29.7	-21°53.2
6	6°02.9	283°12.6	22°58.5	246°05.5	21°47.3	109°46.9	-22°17.6	76°32.4	-21°53.3
7	21°05.3	298°11.8	22°58.7	261°06.2	21°47.0	124°49.7	-22°17.5	91°35.0	-21°53.3
8	36°07.8	313°10.9	22°59.0	276°07.0	21°46.6	139°52.5	-22°17.5	106°37.7	-21°53.3
9	51°10.3	328°10.1	22°59.2	291°07.8	21°46.3	154°55.2	-22°17.5	121°40.3	-21°53.4
10	66°12.7	343°09.2	22°59.5	306°08.6	21°46.0	169°58.0	-22°17.5	136°43.0	-21°53.4
11	81°15.2	358°08.4	22°59.7	321°09.4	21°45.7	185°00.8	-22°17.5	151°45.6	-21°53.4
12	96°17.7	13°07.5	22°60.0	336°10.2	21°45.4	200°03.6	-22°17.4	166°48.3	-21°53.4
13	111°20.1	28°06.7	23°00.2	351°11.0	21°45.0	215°06.3	-22°17.4	181°50.9	-21°53.5
14	126°22.6	43°05.8	23°00.4	6°11.7	21°44.7	230°09.1	-22°17.4	196°53.6	-21°53.5
15	141°25.1	58°05.0	23°00.7	21°12.5	21°44.4	245°11.9	-22°17.4	211°56.3	-21°53.5
16	156°27.5	73°04.1	23°00.9	36°13.3	21°44.1	260°14.6	-22°17.4	226°58.9	-21°53.5
17	171°30.0	88°03.3	23°01.2	51°14.1	21°43.8	275°17.4	-22°17.3	242°01.6	-21°53.6
18	186°32.4	103°02.4	23°01.4	66°14.9	21°43.5	290°20.2	-22°17.3	257°04.2	-21°53.6
19	201°34.9	118°01.6	23°01.7	81°15.7	21°43.1	305°23.0	-22°17.3	272°06.9	-21°53.6
20	216°37.4	133°00.7	23°01.9	96°16.5	21°42.8	320°25.7	-22°17.3	287°09.5	-21°53.7
21	231°39.8	147°59.9	23°02.1	111°17.2	21°42.5	335°28.5	-22°17.2	302°12.2	-21°53.7
22	246°42.3	162°59.0	23°02.4	126°18.0	21°42.2	350°31.3	-22°17.2	317°14.8	-21°53.7
23	261°44.8	177°58.2	23°02.6	141°18.8	21°41.9	5°34.0	-22°17.2	332°17.5	-21°53.7
Mer.pass.:5:35:		v-0.8 d0.3 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	276°47.2	192°57.3	23°02.8	156°19.6	21°41.5	20°36.8	-22°17.2	347°20.1	-21°53.8
1	291°49.7	207°56.5	23°03.1	171°20.4	21°41.2	35°39.6	-22°17.2	2°22.8	-21°53.8
2	306°52.2	222°55.6	23°03.3	186°21.2	21°40.9	50°42.3	-22°17.1	17°25.5	-21°53.8
3	321°54.6	237°54.8	23°03.5	201°22.0	21°40.6	65°45.1	-22°17.1	32°28.1	-21°53.8
4	336°57.1	252°53.9	23°03.8	216°22.8	21°40.3	80°47.9	-22°17.1	47°30.8	-21°53.9
5	351°59.6	267°53.1	23°04.0	231°23.5	21°39.9	95°50.7	-22°17.1	62°33.4	-21°53.9
6	7°02.0	282°52.2	23°04.2	246°24.3	21°39.6	110°53.4	-22°17.1	77°36.1	-21°53.9
7	22°04.5	297°51.4	23°04.4	261°25.1	21°39.3	125°56.2	-22°17.0	92°38.7	-21°53.9
8	37°06.9	312°50.5	23°04.7	276°25.9	21°39.0	140°59.0	-22°17.0	107°41.4	-21°54.0
9	52°09.4	327°49.7	23°04.9	291°26.7	21°38.6	156°01.7	-22°17.0	122°44.0	-21°54.0
10	67°11.9	342°48.8	23°05.1	306°27.5	21°38.3	171°04.5	-22°17.0	137°46.7	-21°54.0
11	82°14.3	357°48.0	23°05.3	321°28.3	21°38.0	186°07.3	-22°17.0	152°49.3	-21°54.1
12	97°16.8	12°47.1	23°05.5	336°29.1	21°37.7	201°10.0	-22°16.9	167°52.0	-21°54.1
13	112°19.3	27°46.3	23°05.8	351°29.8	21°37.3	216°12.8	-22°16.9	182°54.7	-21°54.1
14	127°21.7	42°45.4	23°06.0	6°30.6	21°37.0	231°15.6	-22°16.9	197°57.3	-21°54.1
15	142°24.2	57°44.6	23°06.2	21°31.4	21°36.7	246°18.3	-22°16.9	212°60.0	-21°54.2
16	157°26.7	72°43.7	23°06.4	36°32.2	21°36.4	261°21.1	-22°16.9	228°02.6	-21°54.2
17	172°29.1	87°42.9	23°06.6	51°33.0	21°36.0	276°23.9	-22°16.8	243°05.3	-21°54.2
18	187°31.6	102°42.0	23°06.8	66°33.8	21°35.7	291°26.6	-22°16.8	258°07.9	-21°54.2
19	202°34.1	117°41.1	23°07.0	81°34.6	21°35.4	306°29.4	-22°16.8	273°10.6	-21°54.3
20	217°36.5	132°40.3	23°07.2	96°35.4	21°35.1	321°32.2	-22°16.8	288°13.2	-21°54.3
21	232°39.0	147°39.4	23°07.5	111°36.2	21°34.7	336°34.9	-22°16.8	303°15.9	-21°54.3
22	247°41.4	162°38.6	23°07.7	126°36.9	21°34.4	351°37.7	-22°16.7	318°18.6	-21°54.4
23	262°43.9	177°37.7	23°07.9	141°37.7	21°34.1	6°40.5	-22°16.7	333°21.2	-21°54.4
Mer.pass.:5:31:		v-0.9 d0.2 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Stars

	SHA	Dec
Alpheratz	357°39.2	29°11.6
Ankaa	353°11.6	-42°11.9
Schedar	349°35.9	56°38.3
Diphda	348°51.7	-17°52.8
Achernar	335°23.9	-57°08.1
Hamal	327°56.3	23°33.0
Polaris	316°16.6	89°20.4
Akamar	315°15.5	-40°13.6
Menkar	314°11.0	4°09.8
Mirfak	308°34.8	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.9
Capella	280°28.9	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.3
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.5
Sirius	258°30.4	-16°44.5
Adara	255°09.7	-29°00.0
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°17.0	-59°34.5
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.6	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.9	61°39.1
Denebola	182°29.4	14°28.0
Gienah	175°48.0	-17°39.0
Acrux	173°04.7	-63°12.6
Gacrux	171°56.3	-57°13.5
Alioth	166°17.0	55°51.7
Spica	158°26.8	-11°15.7
Alcaid	152°55.4	49°13.4
Hadar	148°41.7	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.7	-60°55.0
Zubenelg.	137°00.6	-16°07.2
Kochab	137°19.3	74°04.9
Alphecca	126°07.3	26°39.2
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.3
Kaus Aust.	83°37.9	-34°22.3
Vega	80°35.8	38°48.2
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.2
Peacock	53°12.2	-56°40.1
Deneb	49°28.3	45°20.9
Enif	33°42.9	9°57.8
Alnair	27°38.3	-46°51.8
Fomalhaut	15°19.4	-29°31.0
Scheat	13°49.3	28°11.1
Markab	13°34.1	15°18.5

2019/6/2	SHA	Mer.pass
Venus	278°48.9	11:06
Mars	240°53.0	13:36
Jupiter	103°34.7	22:42
Saturn	70°23.8	00:59

2019/6/2	SHA	Mer.pass
Venus	277°29.6	11:07
Mars	240°12.7	13:35
Jupiter	103°42.2	22:38
Saturn	70°28.3	00:55

2019/6/2	SHA	Mer.pass
Venus	276°10.1	11:09
Mars	239°32.4	13:34
Jupiter	103°49.6	22:33
Saturn	70°32.9	00:51

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°16.2	23°20.3	251°36.6	14.8	4°03.0	11.6	55.3
1	194°16.1	23°20.2	266°10.4	14.8	4°14.6	11.5	55.3
2	209°15.9	23°20.1	280°44.1	14.7	4°26.1	11.5	55.4
3	224°15.8	23°20.0	295°17.9	14.7	4°37.6	11.5	55.4
4	239°15.7	23°19.9	309°51.5	14.7	4°49.2	11.5	55.4
5	254°15.5	23°19.8	324°25.2	14.6	5°00.7	11.5	55.5
6	269°15.4	23°19.7	338°58.8	14.6	5°12.2	11.5	55.5
7	284°15.3	23°19.6	353°32.3	14.5	5°23.7	11.5	55.5
8	299°15.2	23°19.5	8°05.8	14.5	5°35.2	11.5	55.5
9	314°15.0	23°19.4	22°39.3	14.4	5°46.7	11.5	55.6
10	329°14.9	23°19.3	37°12.6	14.4	5°58.1	11.5	55.6
11	344°14.8	23°19.2	51°46.0	14.3	6°09.6	11.4	55.6
12	359°14.6	23°19.1	66°19.3	14.3	6°21.0	11.4	55.6
13	14°14.5	23°19.0	80°52.5	14.2	6°32.4	11.4	55.7
14	29°14.4	23°18.9	95°25.7	14.2	6°43.8	11.4	55.7
15	44°14.2	23°18.8	109°58.9	14.1	6°55.2	11.4	55.7
16	59°14.1	23°18.7	124°31.9	14.1	7°06.6	11.4	55.8
17	74°14.0	23°18.6	139°05.0	14.0	7°17.9	11.3	55.8
18	89°13.9	23°18.5	153°37.9	13.9	7°29.3	11.3	55.8
19	104°13.7	23°18.4	168°10.8	13.9	7°40.6	11.3	55.8
20	119°13.6	23°18.3	182°43.7	13.8	7°51.9	11.3	55.9
21	134°13.5	23°18.2	197°16.5	13.8	8°03.1	11.3	55.9
22	149°13.3	23°18.1	211°49.2	13.7	8°14.4	11.2	55.9
23	164°13.2	23°18.0	226°21.9	13.6	8°25.6	11.2	56.0
	SD.=15.7	d=-0.1			S.D.=15.1		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	179°13.1	23°17.9	240°54.5	13.6	8°36.8	11.2	56.0
1	194°12.9	23°17.7	255°27.0	13.5	8°48.0	11.2	56.0
2	209°12.8	23°17.6	269°59.5	13.4	8°59.1	11.1	56.0
3	224°12.7	23°17.5	284°31.9	13.4	9°10.2	11.1	56.1
4	239°12.6	23°17.4	299°04.2	13.3	9°21.3	11.1	56.1
5	254°12.4	23°17.3	313°36.5	13.2	9°32.4	11.0	56.1
6	269°12.3	23°17.2	328°08.7	13.2	9°43.4	11.0	56.2
7	284°12.2	23°17.1	342°40.8	13.1	9°54.4	11.0	56.2
8	299°12.0	23°17.0	357°12.9	13.0	10°05.4	10.9	56.2
9	314°11.9	23°16.8	11°44.9	13.0	10°16.3	10.9	56.3
10	329°11.8	23°16.7	26°16.8	12.9	10°27.2	10.9	56.3
11	344°11.7	23°16.6	40°48.7	12.8	10°38.1	10.8	56.3
12	359°11.5	23°16.5	55°20.4	12.7	10°48.9	10.8	56.4
13	14°11.4	23°16.4	69°52.2	12.7	10°59.7	10.8	56.4
14	29°11.3	23°16.3	84°23.8	12.6	11°10.4	10.7	56.4
15	44°11.1	23°16.1	98°55.3	12.5	11°21.1	10.7	56.5
16	59°11.0	23°16.0	113°26.8	12.4	11°31.8	10.6	56.5
17	74°10.9	23°15.9	127°58.2	12.4	11°42.4	10.6	56.5
18	89°10.8	23°15.8	142°29.5	12.3	11°53.0	10.6	56.6
19	104°10.6	23°15.7	157°00.8	12.2	12°03.6	10.5	56.6
20	119°10.5	23°15.5	171°31.9	12.1	12°14.1	10.5	56.6
21	134°10.4	23°15.4	186°03.0	12.0	12°24.5	10.4	56.7
22	149°10.2	23°15.3	200°34.0	12.0	12°34.9	10.4	56.7
23	164°10.1	23°15.2	215°04.9	11.9	12°45.3	10.3	56.7
	SD.=15.7	d=-0.1			S.D.=15.3		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	179°10.0	23°15.0	229°35.8	11.8	12°55.6	10.3	56.8
1	194°09.9	23°14.9	244°06.5	11.7	13°05.8	10.2	56.8
2	209°09.7	23°14.8	258°37.2	11.6	13°16.0	10.2	56.8
3	224°09.6	23°14.7	273°07.8	11.5	13°26.2	10.1	56.9
4	239°09.5	23°14.5	287°38.3	11.5	13°36.3	10.1	56.9
5	254°09.4	23°14.4	302°08.7	11.4	13°46.3	10.0	56.9
6	269°09.2	23°14.3	316°39.0	11.3	13°56.3	10.0	57.0
7	284°09.1	23°14.1	331°09.2	11.2	14°06.2	9.9	57.0
8	299°09.0	23°14.0	345°39.4	11.1	14°16.1	9.8	57.0
9	314°08.8	23°13.9	0°09.4	11.0	14°25.9	9.8	57.1
10	329°08.7	23°13.7	14°39.4	10.9	14°35.7	9.7	57.1
11	344°08.6	23°13.6	29°09.3	10.8	14°45.4	9.7	57.1
12	359°08.5	23°13.5	43°39.1	10.7	14°55.0	9.6	57.2
13	14°08.3	23°13.3	58°08.8	10.7	15°04.5	9.5	57.2
14	29°08.2	23°13.2	72°38.4	10.6	15°14.0	9.5	57.2
15	44°08.1	23°13.1	87°07.9	10.5	15°23.4	9.4	57.3
16	59°08.0	23°12.9	101°37.4	10.4	15°32.8	9.3	57.3
17	74°07.8	23°12.8	116°06.7	10.3	15°42.1	9.2	57.3
18	89°07.7	23°12.7	130°35.9	10.2	15°51.3	9.2	57.4
19	104°07.6	23°12.5	145°05.1	10.1	16°00.4	9.1	57.4
20	119°07.5	23°12.4	159°34.1	10.0	16°09.5	9.0	57.4
21	134°07.3	23°12.2	174°03.1	9.9	16°18.5	9.0	57.5
22	149°07.2	23°12.1	188°32.0	9.8	16°27.4	8.9	57.5
23	164°07.1	23°12.0	203°00.7	9.7	16°36.2	8.8	57.5
	SD.=15.7	d=-0.1			S.D.=15.5		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	–:–	–:–	–:–	–:–
64	–:–	–:–	01:36	22:29	–:–	–:–
62	–:–	–:–	02:13	21:53	–:–	–:–
60	–:–	00:56	02:39	21:27	23:09	–:–
58	–:–	01:45	02:59	21:07	22:21	–:–
56	–:–	02:14	03:16	20:50	21:52	–:–
54	00:52	02:36	03:30	20:36	21:30	23:13
52	01:36	02:54	03:42	20:24	21:12	22:30
50	02:04	03:09	03:53	20:13	20:58	22:02
45	02:49	03:38	04:16	19:51	20:28	21:18
40	03:19	04:01	04:33	19:33	20:06	20:47
35	03:42	04:19	04:48	19:18	19:48	20:24
30	04:01	04:34	05:01	19:05	19:33	20:06
20	04:29	04:59	05:23	18:43	19:08	19:37
10	04:52	05:19	05:42	18:24	18:47	19:14
0	05:11	05:37	05:60	18:07	18:29	18:56
-10	05:28	05:54	06:17	17:50	18:12	18:39
-20	05:44	06:11	06:35	17:31	17:55	18:23
-30	06:00	06:30	06:56	17:10	17:36	18:06
-35	06:09	06:41	07:09	16:58	17:26	17:58
-40	06:18	06:52	07:23	16:44	17:14	17:48
-45	06:29	07:06	07:40	16:27	17:01	17:38
-50	06:40	07:22	08:00	16:06	16:45	17:26
-52	06:45	07:29	08:10	15:57	16:37	17:21
-54	06:51	07:37	08:21	15:46	16:29	17:16
-56	06:57	07:46	08:34	15:33	16:20	17:09
-58	07:04	07:56	08:48	15:19	16:10	17:03
-60	07:11	08:08	09:05	15:01	15:59	16:55

	Moonrise			Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	00:24	00:07	23:06	15:07	17:05	19:27
70	00:30	00:19	00:07	14:56	16:44	18:44
68	00:34	00:29	00:25	14:48	16:28	18:15
66	00:38	00:38	00:39	14:41	16:15	17:54
64	00:41	00:45	00:51	14:35	16:04	17:37
62	00:44	00:51	01:01	14:30	15:55	17:23
60	00:47	00:57	01:10	14:26	15:47	17:12
58	00:49	01:02	01:17	14:22	15:40	17:01
56	00:51	01:06	01:24	14:19	15:34	16:53
54	00:52	01:10	01:30	14:16	15:29	16:45
52	00:54	01:13	01:36	14:13	15:24	16:38
50	00:56	01:17	01:41	14:10	15:20	16:32
45	00:59	01:24	01:52	14:05	15:10	16:18
40	01:02	01:30	02:01	14:00	15:03	16:07
35	01:04	01:35	02:08	13:57	14:56	15:58
30	01:06	01:39	02:15	13:53	14:50	15:49
20	01:10	01:47	02:27	13:47	14:40	15:35
10	01:13	01:54	02:38	13:42	14:31	15:23
0	01:16	02:01	02:48	13:37	14:23	15:11
-10	01:19	02:07	02:58	13:32	14:14	14:60
-20	01:23	02:14	03:08	13:27	14:06	14:48
-30	01:27	02:22	03:21	13:21	13:56	14:34
-35	01:29	02:27	03:28	13:18	13:50	14:25
-40	01:31	02:32	03:36	13:14	13:43	14:16
-45	01:34	02:39	03:46	13:10	13:36	14:06
-50	01:38	02:46	03:57	13:04	13:27	13:53
-52	01:40	02:50	04:03	13:02	13:22	13:47
-54	01:41	02:54	04:09	12:59	13:18	13:40
-56	01:43	02:58	04:15	12:57	13:13	13:33
-58	01:46	03:03	04:23	12:53	13:07	13:25
-60	01:48	03:08	04:31	12:50	13:01	13:15

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	02:55	03:02	12:03	07:26	19:48	24(30%)
28	03:08	03:14	12:03	08:11	20:35	25(21%)
29	03:20	03:26	12:03	08:59	21:24	26(13%)

June 30, 01 ,02 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	277°46.4	192°36.9	23°08.1	156°38.5	21°33.8	21°43.2	-22°16.7	348°23.9	-21°54.4
1	292°48.8	207°36.0	23°08.3	171°39.3	21°33.4	36°46.0	-22°16.7	3°26.5	-21°54.4
2	307°51.3	222°35.2	23°08.5	186°40.1	21°33.1	51°48.8	-22°16.7	18°29.2	-21°54.5
3	322°53.8	237°34.3	23°08.7	201°40.9	21°32.8	66°51.5	-22°16.6	33°31.8	-21°54.5
4	337°56.2	252°33.4	23°08.9	216°41.7	21°32.5	81°54.3	-22°16.6	48°34.5	-21°54.5
5	352°58.7	267°32.6	23°09.1	231°42.5	21°32.1	96°57.1	-22°16.6	63°37.2	-21°54.5
6	8°01.2	282°31.7	23°09.3	246°43.3	21°31.8	111°59.8	-22°16.6	78°39.8	-21°54.6
7	23°03.6	297°30.9	23°09.5	261°44.1	21°31.5	127°02.6	-22°16.6	93°42.5	-21°54.6
8	38°06.1	312°30.0	23°09.7	276°44.9	21°31.1	142°05.4	-22°16.5	108°45.1	-21°54.6
9	53°08.6	327°29.2	23°09.9	291°45.6	21°30.8	157°08.1	-22°16.5	123°47.8	-21°54.7
10	68°11.0	342°28.3	23°10.1	306°46.4	21°30.5	172°10.9	-22°16.5	138°50.4	-21°54.7
11	83°13.5	357°27.4	23°10.3	321°47.2	21°30.1	187°13.7	-22°16.5	153°53.1	-21°54.7
12	98°15.9	12°26.6	23°10.4	336°48.0	21°29.8	202°16.4	-22°16.5	168°55.7	-21°54.7
13	113°18.4	27°25.7	23°10.6	351°48.8	21°29.5	217°19.2	-22°16.4	183°58.4	-21°54.8
14	128°20.9	42°24.9	23°10.8	6°49.6	21°29.2	232°21.9	-22°16.4	199°01.1	-21°54.8
15	143°23.3	57°24.0	23°11.0	21°50.4	21°28.8	247°24.7	-22°16.4	214°03.7	-21°54.8
16	158°25.8	72°23.2	23°11.2	36°51.2	21°28.5	262°27.5	-22°16.4	229°06.4	-21°54.8
17	173°28.3	87°22.3	23°11.4	51°52.0	21°28.2	277°30.2	-22°16.4	244°09.0	-21°54.9
18	188°30.7	102°21.4	23°11.6	66°52.8	21°27.8	292°33.0	-22°16.3	259°11.7	-21°54.9
19	203°33.2	117°20.6	23°11.8	81°53.6	21°27.5	307°35.8	-22°16.3	274°14.3	-21°54.9
20	218°35.7	132°19.7	23°11.9	96°54.4	21°27.2	322°38.5	-22°16.3	289°17.0	-21°54.9
21	233°38.1	147°18.9	23°12.1	111°55.2	21°26.8	337°41.3	-22°16.3	304°19.7	-21°55.0
22	248°40.6	162°18.0	23°12.3	126°55.9	21°26.5	352°44.0	-22°16.3	319°22.3	-21°55.0
23	263°43.0	177°17.1	23°12.5	141°56.7	21°26.2	7°46.8	-22°16.3	334°25.0	-21°55.0
Mer.pass.:5:28:		v-0.9 d0.2 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	278°45.5	192°16.3	23°12.7	156°57.5	21°25.8	22°49.6	-22°16.2	349°27.6	-21°55.1
1	293°48.0	207°15.4	23°12.8	171°58.3	21°25.5	37°52.3	-22°16.2	4°30.3	-21°55.1
2	308°50.4	222°14.6	23°13.0	186°59.1	21°25.2	52°55.1	-22°16.2	19°32.9	-21°55.1
3	323°52.9	237°13.7	23°13.2	201°59.9	21°24.8	67°57.9	-22°16.2	34°35.6	-21°55.1
4	338°55.4	252°12.8	23°13.4	217°00.7	21°24.5	83°00.6	-22°16.2	49°38.3	-21°55.2
5	353°57.8	267°12.0	23°13.5	232°01.5	21°24.2	98°03.4	-22°16.1	64°40.9	-21°55.2
6	9°00.3	282°11.1	23°13.7	247°02.3	21°23.8	113°06.1	-22°16.1	79°43.6	-21°55.2
7	24°02.8	297°10.3	23°13.9	262°03.1	21°23.5	128°08.9	-22°16.1	94°46.2	-21°55.2
8	39°05.2	312°09.4	23°14.0	277°03.9	21°23.2	143°11.7	-22°16.1	109°48.9	-21°55.3
9	54°07.7	327°08.5	23°14.2	292°04.7	21°22.8	158°14.4	-22°16.1	124°51.5	-21°55.3
10	69°10.2	342°07.7	23°14.4	307°05.5	21°22.5	173°17.2	-22°16.0	139°54.2	-21°55.3
11	84°12.6	357°06.8	23°14.5	322°06.3	21°22.1	188°19.9	-22°16.0	154°56.9	-21°55.4
12	99°15.1	12°05.9	23°14.7	337°07.1	21°21.8	203°22.7	-22°16.0	169°59.5	-21°55.4
13	114°17.5	27°05.1	23°14.9	352°07.9	21°21.5	218°25.5	-22°16.0	185°02.2	-21°55.4
14	129°20.0	42°04.2	23°15.0	7°08.7	21°21.1	233°28.2	-22°16.0	200°04.8	-21°55.4
15	144°22.5	57°03.4	23°15.2	22°09.4	21°20.8	248°31.0	-22°15.9	215°07.5	-21°55.5
16	159°24.9	72°02.5	23°15.3	37°10.2	21°20.5	263°33.7	-22°15.9	230°10.1	-21°55.5
17	174°27.4	87°01.6	23°15.5	52°11.0	21°20.1	278°36.5	-22°15.9	245°12.8	-21°55.5
18	189°29.9	102°00.8	23°15.6	67°11.8	21°19.8	293°39.2	-22°15.9	260°15.5	-21°55.5
19	204°32.3	116°59.9	23°15.8	82°12.6	21°19.4	308°42.0	-22°15.9	275°18.1	-21°55.6
20	219°34.8	131°59.0	23°16.0	97°13.4	21°19.1	323°44.8	-22°15.8	290°20.8	-21°55.6
21	234°37.3	146°58.2	23°16.1	112°14.2	21°18.8	338°47.5	-22°15.8	305°23.4	-21°55.6
22	249°39.7	161°57.3	23°16.3	127°15.0	21°18.4	353°50.3	-22°15.8	320°26.1	-21°55.7
23	264°42.2	176°56.4	23°16.4	142°15.8	21°18.1	8°53.0	-22°15.8	335°28.7	-21°55.7
Mer.pass.:5:24:		v-0.9 d0.2 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	279°44.7	191°55.6	23°16.6	157°16.6	21°17.8	23°55.8	-22°15.8	350°31.4	-21°55.7
1	294°47.1	206°54.7	23°16.7	172°17.4	21°17.4	38°58.5	-22°15.7	5°34.1	-21°55.7
2	309°49.6	221°53.9	23°16.9	187°18.2	21°17.1	54°01.3	-22°15.7	20°36.7	-21°55.8
3	324°52.0	236°53.0	23°17.0	202°19.0	21°16.7	69°04.1	-22°15.7	35°39.4	-21°55.8
4	339°54.5	251°52.1	23°17.1	217°19.8	21°16.4	84°06.8	-22°15.7	50°42.0	-21°55.8
5	354°57.0	266°51.3	23°17.3	232°20.6	21°16.0	99°09.6	-22°15.7	65°44.7	-21°55.8
6	9°59.4	281°50.4	23°17.4	247°21.4	21°15.7	114°12.3	-22°15.6	80°47.3	-21°55.9
7	25°01.9	296°49.5	23°17.6	262°22.2	21°15.4	129°15.1	-22°15.6	95°50.0	-21°55.9
8	40°04.4	311°48.7	23°17.7	277°23.0	21°15.0	144°17.8	-22°15.6	110°52.7	-21°55.9
9	55°06.8	326°47.8	23°17.8	292°23.8	21°14.7	159°20.6	-22°15.6	125°55.3	-21°56.0
10	70°09.3	341°46.9	23°18.0	307°24.6	21°14.3	174°23.3	-22°15.6	140°58.0	-21°56.0
11	85°11.8	356°46.1	23°18.1	322°25.4	21°14.0	189°26.1	-22°15.5	156°00.6	-21°56.0
12	100°14.2	11°45.2	23°18.3	337°26.2	21°13.7	204°28.9	-22°15.5	171°03.3	-21°56.0
13	115°16.7	26°44.3	23°18.4	352°27.0	21°13.3	219°31.6	-22°15.5	186°06.0	-21°56.1
14	130°19.2	41°43.5	23°18.5	7°27.8	21°13.0	234°34.4	-22°15.5	201°08.6	-21°56.1
15	145°21.6	56°42.6	23°18.7	22°28.6	21°12.6	249°37.1	-22°15.5	216°11.3	-21°56.1
16	160°24.1	71°41.7	23°18.8	37°29.4	21°12.3	264°39.9	-22°15.5	231°13.9	-21°56.1
17	175°26.5	86°40.9	23°18.9	52°30.2	21°11.9	279°42.6	-22°15.4	246°16.6	-21°56.2
18	190°29.0	101°40.0	23°19.0	67°31.0	21°11.6	294°45.4	-22°15.4	261°19.2	-21°56.2
19	205°31.5	116°39.1	23°19.2	82°31.8	21°11.2	309°48.1	-22°15.4	276°21.9	-21°56.2
20	220°33.9	131°38.3	23°19.3	97°32.6	21°10.9	324°50.9	-22°15.4	291°24.6	-21°56.3
21	235°36.4	146°37.4	23°19.4	112°33.4	21°10.6	339°53.6	-22°15.4	306°27.2	-21°56.3
22	250°38.9	161°36.5	23°19.5	127°34.2	21°10.2	354°56.4	-22°15.3	321°29.9	-21°56.3
23	265°41.3	176°35.7	23°19.7	142°35.0	21°09.9	9°59.1	-22°15.3	336°32.5	-21°56.3
Mer.pass.:5:20:		v-0.9 d0.1 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Stars

	SHA	Dec
Alpheratz	357°39.2	29°11.6
Ankaa	353°11.6	-42°11.9
Schedar	349°35.8	56°38.3
Diphda	348°51.7	-17°52.8
Achernar	335°23.9	-57°08.1
Hamal	327°56.3	23°33.0
Polaris	316°15.2	89°20.4
Akamar	315°15.5	-40°13.6
Menkar	314°10.9	4°09.8
Mirfak	308°34.8	49°55.5
Aldebaran	290°45.0	16°32.7
Rigel	281°08.4	-8°10.9
Capella	280°28.8	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.2
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.5
Sirius	258°30.4	-16°44.5
Adara	255°09.7	-29°00.0
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°17.0	-59°34.5
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.6	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.9	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°39.0
Acrux	173°04.7	-63°12.6
Gacrux	171°56.3	-57°13.5
Alioth	166°17.0	55°51.7
Spica	158°26.8	-11°15.7
Alcaid	152°55.5	49°13.4
Hadar	148°41.7	-60°28.1
Menkent	148°02.5	-36°27.9
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.7	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.4	74°04.9
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.3
Kaus Aust.	83°37.9	-34°22.3
Vega	80°35.8	38°48.2
Nunki	75°52.8	-26°16.2
Altair	62°04.0	8°55.2
Peacock	53°12.2	-56°40.1
Deneb	49°28.3	45°20.9
Enif	33°42.9	9°57.8
Alnair	27°38.3	-46°51.8
Fomalhaut	15°19.3	-29°31.0
Scheat	13°49.3	28°11.1
Markab	13°34.1	15°18.5

2019/6/3	SHA	Mer.pass
Venus	274°50.5	11:10
Mars	238°52.2	13:33
Jupiter	103°56.9	22:29
Saturn	70°37.5	00:46

2019/7/1	SHA	Mer.pass
Venus	273°30.8	11:12
Mars	238°12.0	13:31
Jupiter	104°04.1	22:25
Saturn	70°42.1	00:42

2019/7/2	SHA	Mer.pass
Venus	272°10.9	11:13
Mars	237°32.0	13:30
Jupiter	104°11.1	22:20
Saturn	70°46.7	00:38

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°07.0	23°11.8	217°29.4	9.6	16°45.0	8.7	57.6
1	194°06.8	23°11.7	231°58.0	9.5	16°53.7	8.6	57.6
2	209°06.7	23°11.5	246°26.5	9.4	17°02.2	8.6	57.7
3	224°06.6	23°11.4	260°54.9	9.3	17°10.8	8.5	57.7
4	239°06.5	23°11.2	275°23.2	9.3	17°19.2	8.4	57.7
5	254°06.3	23°11.1	289°51.4	9.2	17°27.5	8.3	57.8
6	269°06.2	23°11.0	304°19.5	9.1	17°35.8	8.2	57.8
7	284°06.1	23°10.8	318°47.5	9.0	17°43.9	8.1	57.8
8	299°06.0	23°10.7	333°15.4	8.9	17°52.0	8.0	57.9
9	314°05.8	23°10.5	347°43.3	8.8	17°60.0	7.9	57.9
10	329°05.7	23°10.4	2°11.0	8.7	18°07.9	7.8	57.9
11	344°05.6	23°10.2	16°38.6	8.6	18°15.7	7.7	58.0
12	359°05.5	23°10.1	31°06.1	8.5	18°23.4	7.6	58.0
13	14°05.3	23°09.9	45°33.6	8.4	18°31.0	7.6	58.0
14	29°05.2	23°09.8	60°00.9	8.3	18°38.5	7.5	58.1
15	44°05.1	23°09.6	74°28.2	8.2	18°45.9	7.4	58.1
16	59°05.0	23°09.4	88°55.3	8.1	18°53.2	7.2	58.1
17	74°04.8	23°09.3	103°22.4	8.0	19°00.4	7.1	58.2
18	89°04.7	23°09.1	117°49.4	7.9	19°07.4	7.0	58.2
19	104°04.6	23°09.0	132°16.2	7.8	19°14.4	6.9	58.2
20	119°04.5	23°08.8	146°43.0	7.7	19°21.3	6.8	58.3
21	134°04.3	23°08.7	161°09.7	7.6	19°28.1	6.7	58.3
22	149°04.2	23°08.5	175°36.3	7.6	19°34.8	6.6	58.3
23	164°04.1	23°08.4	190°02.8	7.5	19°41.3	6.5	58.4
	SD.=15.7	d=-0.1			S.D.=15.7		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°04.0	23°08.2	204°29.2	7.4	19°47.8	6.4	58.4
1	194°03.8	23°08.0	218°55.6	7.3	19°54.1	6.3	58.4
2	209°03.7	23°07.9	233°21.8	7.2	20°00.3	6.2	58.5
3	224°03.6	23°07.7	247°47.9	7.1	20°06.4	6.0	58.5
4	239°03.5	23°07.5	262°14.0	7.0	20°12.4	5.9	58.5
5	254°03.4	23°07.4	276°39.9	6.9	20°18.3	5.8	58.6
6	269°03.2	23°07.2	291°05.8	6.8	20°24.0	5.7	58.6
7	284°03.1	23°07.1	305°31.6	6.7	20°29.6	5.6	58.6
8	299°03.0	23°06.9	319°57.3	6.7	20°35.1	5.4	58.7
9	314°02.9	23°06.7	334°22.9	6.6	20°40.5	5.3	58.7
10	329°02.7	23°06.6	348°48.5	6.5	20°45.8	5.2	58.7
11	344°02.6	23°06.4	3°13.9	6.4	20°50.9	5.1	58.8
12	359°02.5	23°06.2	17°39.3	6.3	20°55.9	4.9	58.8
13	14°02.4	23°06.1	32°04.6	6.2	21°00.8	4.8	58.8
14	29°02.3	23°05.9	46°29.8	6.2	21°05.5	4.7	58.8
15	44°02.1	23°05.7	60°54.9	6.1	21°10.1	4.5	58.9
16	59°02.0	23°05.5	75°20.0	6.0	21°14.6	4.4	58.9
17	74°01.9	23°05.4	89°45.0	5.9	21°18.9	4.3	58.9
18	89°01.8	23°05.2	104°09.9	5.9	21°23.1	4.1	59.0
19	104°01.6	23°05.0	118°34.7	5.8	21°27.2	4.0	59.0
20	119°01.5	23°04.9	132°59.4	5.7	21°31.2	3.9	59.0
21	134°01.4	23°04.7	147°24.1	5.6	21°35.0	3.7	59.1
22	149°01.3	23°04.5	161°48.7	5.6	21°38.6	3.6	59.1
23	164°01.2	23°04.3	176°13.3	5.5	21°42.2	3.5	59.1
	SD.=15.7	d=-0.2			S.D.=15.9		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°01.0	23°04.2	190°37.7	5.4	21°45.5	3.3	59.1
1	194°00.9	23°04.0	205°02.1	5.4	21°48.8	3.2	59.2
2	209°00.8	23°03.8	219°26.5	5.3	21°51.9	3.0	59.2
3	224°00.7	23°03.6	233°50.8	5.2	21°54.8	2.9	59.2
4	239°00.6	23°03.4	248°15.0	5.2	21°57.7	2.7	59.2
5	254°00.4	23°03.3	262°39.1	5.1	22°00.3	2.6	59.3
6	269°00.3	23°03.1	277°03.2	5.1	22°02.8	2.4	59.3
7	284°00.2	23°02.9	291°27.3	5.0	22°05.2	2.3	59.3
8	299°00.1	23°02.7	305°51.3	5.0	22°07.4	2.2	59.4
9	313°60.0	23°02.5	320°15.2	4.9	22°09.5	2.0	59.4
10	328°59.8	23°02.4	334°39.1	4.9	22°11.4	1.9	59.4
11	343°59.7	23°02.2	349°02.9	4.8	22°13.2	1.7	59.4
12	358°59.6	23°02.0	3°26.7	4.8	22°14.9	1.6	59.5
13	13°59.5	23°01.8	17°50.4	4.7	22°16.3	1.4	59.5
14	28°59.4	23°01.6	32°14.1	4.7	22°17.7	1.2	59.5
15	43°59.2	23°01.4	46°37.7	4.6	22°18.8	1.1	59.5
16	58°59.1	23°01.2	61°01.3	4.6	22°19.8	0.9	59.5
17	73°59.0	23°01.1	75°24.9	4.5	22°20.7	0.8	59.6
18	88°58.9	23°00.9	89°48.4	4.5	22°21.4	0.6	59.6
19	103°58.8	23°00.7	104°11.9	4.5	22°22.0	0.5	59.6
20	118°58.7	23°00.5	118°35.4	4.4	22°22.4	0.3	59.6
21	133°58.5	23°00.3	132°58.8	4.4	22°22.6	0.2	59.7
22	148°58.4	23°00.1	147°22.2	4.4	22°22.7	0.0	59.7
23	163°58.3	22°59.9	161°45.6	4.4	22°22.7	-0.1	59.7
	SD.=15.7	d=-0.2			S.D.=16.1		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:17	23:41	–:–	–:–
64	–:–	–:–	01:41	22:25	–:–	–:–
62	–:–	–:–	02:17	21:50	–:–	–:–
60	–:–	01:03	02:42	21:25	23:03	–:–
58	–:–	01:48	03:02	21:05	22:19	–:–
56	–:–	02:17	03:18	20:49	21:50	–:–
54	00:57	02:38	03:32	20:35	21:29	23:08
52	01:40	02:56	03:44	20:23	21:11	22:27
50	02:06	03:11	03:55	20:13	20:57	22:01
45	02:51	03:40	04:17	19:50	20:28	21:17
40	03:21	04:02	04:35	19:33	20:05	20:47
35	03:43	04:20	04:50	19:18	19:48	20:24
30	04:02	04:35	05:02	19:05	19:33	20:06
20	04:30	04:60	05:24	18:43	19:08	19:37
10	04:53	05:20	05:43	18:25	18:48	19:15
0	05:12	05:38	06:00	18:07	18:30	18:56
-10	05:28	05:55	06:17	17:50	18:13	18:39
-20	05:44	06:12	06:36	17:32	17:56	18:23
-30	06:00	06:30	06:57	17:11	17:37	18:07
-35	06:09	06:41	07:09	16:59	17:27	17:59
-40	06:18	06:52	07:23	16:45	17:16	17:50
-45	06:28	07:06	07:39	16:29	17:02	17:39
-50	06:40	07:21	07:60	16:08	16:46	17:28
-52	06:45	07:29	08:09	15:58	16:39	17:23
-54	06:51	07:37	08:20	15:48	16:31	17:17
-56	06:57	07:46	08:33	15:35	16:22	17:11
-58	07:03	07:56	08:47	15:21	16:12	17:05
-60	07:11	08:07	09:04	15:04	16:01	16:57

		Moonrise			**Moonset**	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	23:10	–:–	–:–	21:15	–:–	–:–
68	00:19	00:13	00:03	20:13	22:23	–:–
66	00:42	00:49	01:07	19:38	21:19	22:38
64	00:60	01:15	01:43	19:13	20:44	21:58
62	01:14	01:35	02:09	18:53	20:18	21:30
60	01:27	01:52	02:29	18:37	19:59	21:08
58	01:38	02:06	02:45	18:23	19:42	20:51
56	01:47	02:18	02:60	18:12	19:28	20:36
54	01:55	02:28	03:12	18:02	19:16	20:23
52	02:03	02:38	03:23	17:53	19:06	20:12
50	02:10	02:46	03:32	17:45	18:56	20:02
45	02:24	03:04	03:53	17:27	18:36	19:41
40	02:36	03:19	04:09	17:14	18:20	19:24
35	02:47	03:31	04:23	17:02	18:06	19:10
30	02:56	03:42	04:35	16:51	17:55	18:57
20	03:11	04:01	04:56	16:34	17:34	18:36
10	03:25	04:17	05:14	16:18	17:17	18:17
0	03:38	04:33	05:31	16:04	17:00	18:00
-10	03:51	04:48	05:48	15:50	16:44	17:43
-20	04:05	05:05	06:07	15:34	16:26	17:24
-30	04:21	05:24	06:28	15:17	16:06	17:03
-35	04:31	05:36	06:40	15:07	15:55	16:50
-40	04:42	05:49	06:54	14:55	15:41	16:36
-45	04:54	06:04	07:11	14:41	15:25	16:19
-50	05:10	06:23	07:32	14:25	15:05	15:57
-52	05:17	06:32	07:42	14:17	14:56	15:47
-54	05:26	06:42	07:54	14:08	14:46	15:36
-56	05:35	06:53	08:07	13:59	14:34	15:23
-58	05:45	07:07	08:22	13:48	14:21	15:08
-60	05:57	07:22	08:39	13:35	14:05	14:50

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
30	03:32	03:38	12:03	09:50	22:18	27(7%)
1	03:44	03:50	12:03	10:46	23:15	28(2%)
2	03:56	04:02	12:04	11:45	00:16	29(0%)

July 03, 04 ,05 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	280°43.8	191°34.8	23°19.8	157°35.8	21°09.5	25°01.9	-22°15.3	351°35.2	-21°56.4
1	295°46.3	206°33.9	23°19.9	172°36.6	21°09.2	40°04.6	-22°15.3	6°37.9	-21°56.4
2	310°48.7	221°33.1	23°20.0	187°37.4	21°08.8	55°07.4	-22°15.3	21°40.5	-21°56.4
3	325°51.2	236°32.2	23°20.1	202°38.2	21°08.5	70°10.1	-22°15.2	36°43.2	-21°56.4
4	340°53.7	251°31.3	23°20.3	217°39.0	21°08.1	85°12.9	-22°15.2	51°45.8	-21°56.5
5	355°56.1	266°30.5	23°20.4	232°39.8	21°07.8	100°15.7	-22°15.2	66°48.5	-21°56.5
6	10°58.6	281°29.6	23°20.5	247°40.6	21°07.4	115°18.4	-22°15.2	81°51.1	-21°56.5
7	26°01.0	296°28.7	23°20.6	262°41.4	21°07.1	130°21.2	-22°15.2	96°53.8	-21°56.6
8	41°03.5	311°27.9	23°20.7	277°42.2	21°06.7	145°23.9	-22°15.1	111°56.5	-21°56.6
9	56°06.0	326°27.0	23°20.8	292°43.0	21°06.4	160°26.7	-22°15.1	126°59.1	-21°56.6
10	71°08.4	341°26.1	23°20.9	307°43.8	21°06.0	175°29.4	-22°15.1	142°01.8	-21°56.6
11	86°10.9	356°25.2	23°21.0	322°44.6	21°05.7	190°32.2	-22°15.1	157°04.4	-21°56.7
12	101°13.4	11°24.4	23°21.1	337°45.4	21°05.3	205°34.9	-22°15.1	172°07.1	-21°56.7
13	116°15.8	26°23.5	23°21.2	352°46.2	21°05.0	220°37.7	-22°15.1	187°09.8	-21°56.7
14	131°18.3	41°22.6	23°21.4	7°47.0	21°04.6	235°40.4	-22°15.0	202°12.4	-21°56.7
15	146°20.8	56°21.8	23°21.5	22°47.8	21°04.3	250°43.1	-22°15.0	217°15.1	-21°56.8
16	161°23.2	71°20.9	23°21.6	37°48.6	21°03.9	265°45.9	-22°15.0	232°17.7	-21°56.8
17	176°25.7	86°20.0	23°21.7	52°49.4	21°03.6	280°48.6	-22°15.0	247°20.4	-21°56.8
18	191°28.2	101°19.2	23°21.8	67°50.2	21°03.2	295°51.4	-22°15.0	262°23.1	-21°56.8
19	206°30.6	116°18.3	23°21.9	82°51.0	21°02.9	310°54.1	-22°14.9	277°25.7	-21°56.9
20	221°33.1	131°17.4	23°22.0	97°51.8	21°02.5	325°56.9	-22°14.9	292°28.4	-21°56.9
21	236°35.5	146°16.5	23°22.1	112°52.6	21°02.2	340°59.6	-22°14.9	307°31.0	-21°56.9
22	251°38.0	161°15.7	23°22.1	127°53.4	21°01.8	356°02.4	-22°14.9	322°33.7	-21°57.0
23	266°40.5	176°14.8	23°22.2	142°54.2	21°01.5	11°05.1	-22°14.9	337°36.3	-21°57.0
Mer.pass.:5:16:		v-0.9 d0.1 m-3.8		v0.8 d-0.3 m1.8		v2.8 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	281°42.9	191°13.9	23°22.3	157°55.0	21°01.1	26°07.9	-22°14.8	352°39.0	-21°57.0
1	296°45.4	206°13.1	23°22.4	172°55.8	21°00.8	41°10.6	-22°14.8	7°41.7	-21°57.0
2	311°47.9	221°12.2	23°22.5	187°56.6	21°00.4	56°13.4	-22°14.8	22°44.3	-21°57.1
3	326°50.3	236°11.3	23°22.6	202°57.4	21°00.1	71°16.1	-22°14.8	37°47.0	-21°57.1
4	341°52.8	251°10.5	23°22.7	217°58.2	20°59.7	86°18.9	-22°14.8	52°49.6	-21°57.1
5	356°55.3	266°09.6	23°22.8	232°59.0	20°59.4	101°21.6	-22°14.7	67°52.3	-21°57.1
6	11°57.7	281°08.7	23°22.9	247°59.8	20°59.0	116°24.4	-22°14.7	82°55.0	-21°57.2
7	27°00.2	296°07.8	23°22.9	263°00.6	20°58.7	131°27.1	-22°14.7	97°57.6	-21°57.2
8	42°02.7	311°07.0	23°23.0	278°01.4	20°58.3	146°29.8	-22°14.7	113°00.3	-21°57.2
9	57°05.1	326°06.1	23°23.1	293°02.2	20°58.0	161°32.6	-22°14.7	128°02.9	-21°57.3
10	72°07.6	341°05.2	23°23.2	308°03.0	20°57.6	176°35.3	-22°14.7	143°05.6	-21°57.3
11	87°10.0	356°04.4	23°23.3	323°03.9	20°57.2	191°38.1	-22°14.6	158°08.3	-21°57.3
12	102°12.5	11°03.5	23°23.3	338°04.7	20°56.9	206°40.8	-22°14.6	173°10.9	-21°57.3
13	117°15.0	26°02.6	23°23.4	353°05.5	20°56.5	221°43.6	-22°14.6	188°13.6	-21°57.4
14	132°17.4	41°01.7	23°23.5	8°06.3	20°56.2	236°46.3	-22°14.6	203°16.2	-21°57.4
15	147°19.9	56°00.9	23°23.6	23°07.1	20°55.8	251°49.1	-22°14.6	218°18.9	-21°57.4
16	162°22.4	70°60.0	23°23.6	38°07.9	20°55.5	266°51.8	-22°14.5	233°21.6	-21°57.4
17	177°24.8	85°59.1	23°23.7	53°08.7	20°55.1	281°54.5	-22°14.5	248°24.2	-21°57.5
18	192°27.3	100°58.3	23°23.8	68°09.5	20°54.8	296°57.3	-22°14.5	263°26.9	-21°57.5
19	207°29.8	115°57.4	23°23.9	83°10.3	20°54.4	312°00.0	-22°14.5	278°29.5	-21°57.5
20	222°32.2	130°56.5	23°23.9	98°11.1	20°54.0	327°02.8	-22°14.5	293°32.2	-21°57.6
21	237°34.7	145°55.6	23°24.0	113°11.9	20°53.7	342°05.5	-22°14.5	308°34.9	-21°57.6
22	252°37.1	160°54.8	23°24.1	128°12.7	20°53.3	357°08.3	-22°14.4	323°37.5	-21°57.6
23	267°39.6	175°53.9	23°24.1	143°13.5	20°53.0	12°11.0	-22°14.4	338°40.2	-21°57.6
Mer.pass.:5:12:		v-0.9 d0.1 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	282°42.1	190°53.0	23°24.2	158°14.3	20°52.6	27°13.7	-22°14.4	353°42.8	-21°57.7
1	297°44.5	205°52.1	23°24.3	173°15.1	20°52.3	42°16.5	-22°14.4	8°45.5	-21°57.7
2	312°47.0	220°51.3	23°24.3	188°15.9	20°51.9	57°19.2	-22°14.4	23°48.2	-21°57.7
3	327°49.5	235°50.4	23°24.4	203°16.7	20°51.5	72°22.0	-22°14.3	38°50.8	-21°57.7
4	342°51.9	250°49.5	23°24.4	218°17.6	20°51.2	87°24.7	-22°14.3	53°53.5	-21°57.8
5	357°54.4	265°48.7	23°24.5	233°18.4	20°50.8	102°27.4	-22°14.3	68°56.1	-21°57.8
6	12°56.9	280°47.8	23°24.6	248°19.2	20°50.5	117°30.2	-22°14.3	83°58.8	-21°57.8
7	27°59.3	295°46.9	23°24.6	263°20.0	20°50.1	132°32.9	-22°14.3	99°01.5	-21°57.9
8	43°01.8	310°46.0	23°24.7	278°20.8	20°49.7	147°35.7	-22°14.2	114°04.1	-21°57.9
9	58°04.3	325°45.2	23°24.7	293°21.6	20°49.4	162°38.4	-22°14.2	129°06.8	-21°57.9
10	73°06.7	340°44.3	23°24.8	308°22.4	20°49.0	177°41.1	-22°14.2	144°09.4	-21°57.9
11	88°09.2	355°43.4	23°24.8	323°23.2	20°48.7	192°43.9	-22°14.2	159°12.1	-21°58.0
12	103°11.6	10°42.5	23°24.9	338°24.0	20°48.3	207°46.6	-22°14.2	174°14.8	-21°58.0
13	118°14.1	25°41.7	23°24.9	353°24.8	20°47.9	222°49.4	-22°14.2	189°17.4	-21°58.0
14	133°16.6	40°40.8	23°25.0	8°25.6	20°47.6	237°52.1	-22°14.1	204°20.1	-21°58.0
15	148°19.0	55°39.9	23°25.0	23°26.4	20°47.2	252°54.8	-22°14.1	219°22.7	-21°58.1
16	163°21.5	70°39.0	23°25.1	38°27.3	20°46.8	267°57.6	-22°14.1	234°25.4	-21°58.1
17	178°24.0	85°38.2	23°25.1	53°28.1	20°46.5	283°00.3	-22°14.1	249°28.1	-21°58.1
18	193°26.4	100°37.3	23°25.1	68°28.9	20°46.1	298°03.1	-22°14.1	264°30.7	-21°58.2
19	208°28.9	115°36.4	23°25.2	83°29.7	20°45.8	313°05.8	-22°14.0	279°33.4	-21°58.2
20	223°31.4	130°35.5	23°25.2	98°30.5	20°45.4	328°08.5	-22°14.0	294°36.0	-21°58.2
21	238°33.8	145°34.7	23°25.3	113°31.3	20°45.0	343°11.3	-22°14.0	309°38.7	-21°58.2
22	253°36.3	160°33.8	23°25.3	128°32.1	20°44.7	358°14.0	-22°14.0	324°41.4	-21°58.3
23	268°38.8	175°32.9	23°25.3	143°32.9	20°44.3	13°16.7	-22°14.0	339°44.0	-21°58.3
Mer.pass.:5:08:		v-0.9 d0.1 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.2	29°11.7
Ankaa	353°11.6	-42°11.9
Schedar	349°35.8	56°38.3
Diphda	348°51.6	-17°52.8
Achernar	335°23.8	-57°08.1
Hamal	327°56.2	23°33.0
Polaris	316°13.7	89°20.4
Akamar	315°15.4	-40°13.6
Menkar	314°10.9	4°09.8
Mirfak	308°34.8	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.4	-8°10.9
Capella	280°28.8	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.8	28°37.2
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.4
Sirius	258°30.3	-16°44.5
Adara	255°09.7	-29°00.0
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°17.0	-59°34.5
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.6	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.9	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°39.0
Acrux	173°04.7	-63°12.6
Gacrux	171°56.3	-57°13.5
Alioth	166°17.1	55°51.7
Spica	158°26.8	-11°15.7
Alcaid	152°55.5	49°13.4
Hadar	148°41.8	-60°28.1
Menkent	148°02.6	-36°27.9
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.8	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.4	74°04.9
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.4
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.2
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.2
Peacock	53°12.2	-56°40.1
Deneb	49°28.2	45°20.9
Enif	33°42.8	9°57.8
Alnair	27°38.3	-46°51.8
Fomalhaut	15°19.3	-29°31.0
Scheat	13°49.2	28°11.1
Markab	13°34.1	15°18.5

2019/7/3	**SHA**	**Mer.pass**
Venus	270°51.0	11:14
Mars	236°52.0	13:29
Jupiter	104°18.1	22:16
Saturn	70°51.4	00:34

2019/7/4	**SHA**	**Mer.pass**
Venus	269°31.0	11:16
Mars	236°12.1	13:28
Jupiter	104°24.9	22:11
Saturn	70°56.1	00:29

2019/7/5	**SHA**	**Mer.pass**
Venus	268°10.9	11:17
Mars	235°32.3	13:26
Jupiter	104°31.7	22:07
Saturn	71°00.8	00:25

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°58.2	22°59.7	176°08.9	4.3	22°22.4	-0.3	59.7
1	193°58.1	22°59.5	190°32.2	4.3	22°22.0	-0.5	59.7
2	208°57.9	22°59.3	204°55.5	4.3	22°21.5	-0.6	59.8
3	223°57.8	22°59.1	219°18.8	4.3	22°20.8	-0.8	59.8
4	238°57.7	22°58.9	233°42.1	4.2	22°20.0	-0.9	59.8
5	253°57.6	22°58.7	248°05.3	4.2	22°19.0	-1.1	59.8
6	268°57.5	22°58.6	262°28.5	4.2	22°17.8	-1.2	59.8
7	283°57.4	22°58.4	276°51.7	4.2	22°16.5	-1.4	59.9
8	298°57.2	22°58.2	291°14.9	4.2	22°15.0	-1.6	59.9
9	313°57.1	22°58.0	305°38.1	4.2	22°13.3	-1.7	59.9
10	328°57.0	22°57.8	320°01.3	4.2	22°11.5	-1.9	59.9
11	343°56.9	22°57.6	334°24.5	4.2	22°09.6	-2.0	59.9
12	358°56.8	22°57.4	348°47.7	4.2	22°07.5	-2.2	59.9
13	13°56.7	22°57.2	3°10.9	4.2	22°05.2	-2.4	60.0
14	28°56.5	22°57.0	17°34.1	4.2	22°02.8	-2.5	60.0
15	43°56.4	22°56.7	31°57.3	4.2	22°00.2	-2.7	60.0
16	58°56.3	22°56.5	46°20.5	4.2	21°57.4	-2.8	60.0
17	73°56.2	22°56.3	60°43.7	4.2	21°54.5	-3.0	60.0
18	88°56.1	22°56.1	75°06.9	4.2	21°51.5	-3.1	60.0
19	103°56.0	22°55.9	89°30.1	4.2	21°48.2	-3.3	60.1
20	118°55.9	22°55.7	103°53.3	4.2	21°44.9	-3.4	60.1
21	133°55.7	22°55.5	118°16.6	4.3	21°41.3	-3.6	60.1
22	148°55.6	22°55.3	132°39.9	4.3	21°37.7	-3.8	60.1
23	163°55.5	22°55.1	147°03.1	4.3	21°33.8	-3.9	60.1
	SD.=15.7	d=-0.2			S.D.=16.3		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°55.4	22°54.9	161°26.5	4.3	21°29.8	-4.1	60.1
1	193°55.3	22°54.7	175°49.8	4.3	21°25.7	-4.2	60.1
2	208°55.2	22°54.5	190°13.2	4.4	21°21.4	-4.4	60.1
3	223°55.1	22°54.3	204°36.5	4.4	21°17.0	-4.5	60.1
4	238°54.9	22°54.0	218°59.9	4.4	21°12.4	-4.7	60.2
5	253°54.8	22°53.8	233°23.4	4.5	21°07.6	-4.8	60.2
6	268°54.7	22°53.6	247°46.9	4.5	21°02.7	-5.0	60.2
7	283°54.6	22°53.4	262°10.4	4.5	20°57.7	-5.1	60.2
8	298°54.5	22°53.2	276°33.9	4.6	20°52.5	-5.3	60.2
9	313°54.4	22°53.0	290°57.5	4.6	20°47.1	-5.4	60.2
10	328°54.3	22°52.8	305°21.1	4.6	20°41.6	-5.6	60.2
11	343°54.1	22°52.5	319°44.8	4.7	20°36.0	-5.7	60.2
12	358°54.0	22°52.3	334°08.5	4.7	20°30.2	-5.9	60.2
13	13°53.9	22°52.1	348°32.2	4.8	20°24.3	-6.0	60.2
14	28°53.8	22°51.9	2°56.0	4.8	20°18.2	-6.1	60.2
15	43°53.7	22°51.7	17°19.8	4.9	20°12.0	-6.3	60.2
16	58°53.6	22°51.4	31°43.7	4.9	20°05.6	-6.4	60.3
17	73°53.5	22°51.2	46°07.6	4.9	19°59.1	-6.6	60.3
18	88°53.4	22°51.0	60°31.6	5.0	19°52.5	-6.7	60.3
19	103°53.2	22°50.8	74°55.6	5.1	19°45.7	-6.8	60.3
20	118°53.1	22°50.6	89°19.7	5.1	19°38.8	-7.0	60.3
21	133°53.0	22°50.3	103°43.8	5.2	19°31.8	-7.1	60.3
22	148°52.9	22°50.1	118°08.0	5.2	19°24.6	-7.2	60.3
23	163°52.8	22°49.9	132°32.3	5.3	19°17.3	-7.4	60.3
	SD.=15.7	d=-0.2			S.D.=16.4		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°52.7	22°49.7	146°56.6	5.3	19°09.8	-7.5	60.3
1	193°52.6	22°49.4	161°20.9	5.4	19°02.3	-7.6	60.3
2	208°52.5	22°49.2	175°45.3	5.4	18°54.6	-7.8	60.3
3	223°52.4	22°49.0	190°09.8	5.5	18°46.7	-7.9	60.3
4	238°52.2	22°48.7	204°34.3	5.6	18°38.8	-8.0	60.3
5	253°52.1	22°48.5	218°58.9	5.6	18°30.7	-8.2	60.3
6	268°52.0	22°48.3	233°23.6	5.7	18°22.4	-8.3	60.3
7	283°51.9	22°48.0	247°48.3	5.8	18°14.1	-8.4	60.3
8	298°51.8	22°47.8	262°13.1	5.8	18°05.6	-8.5	60.3
9	313°51.7	22°47.6	276°37.9	5.9	17°57.1	-8.6	60.3
10	328°51.6	22°47.4	291°02.9	5.9	17°48.4	-8.8	60.3
11	343°51.5	22°47.1	305°27.8	6.0	17°39.5	-8.9	60.3
12	358°51.4	22°46.9	319°52.9	6.1	17°30.6	-9.0	60.3
13	13°51.3	22°46.6	334°18.0	6.2	17°21.6	-9.1	60.3
14	28°51.2	22°46.4	348°43.2	6.2	17°12.4	-9.2	60.3
15	43°51.0	22°46.2	3°08.4	6.3	17°03.1	-9.3	60.3
16	58°50.9	22°45.9	17°33.8	6.4	16°53.7	-9.4	60.3
17	73°50.8	22°45.7	31°59.2	6.4	16°44.2	-9.6	60.3
18	88°50.7	22°45.5	46°24.6	6.5	16°34.6	-9.7	60.3
19	103°50.6	22°45.2	60°50.1	6.6	16°24.9	-9.8	60.2
20	118°50.5	22°45.0	75°15.7	6.6	16°15.1	-9.9	60.2
21	133°50.4	22°44.7	89°41.4	6.7	16°05.2	-10.0	60.2
22	148°50.3	22°44.5	104°07.2	6.8	15°55.2	-10.1	60.2
23	163°50.2	22°44.3	118°33.0	6.9	15°45.0	-10.2	60.2
	SD.=15.7	d=-0.2			S.D.=16.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:40	23:23	–:–	–:–
64	–:–	–:–	01:47	22:21	–:–	–:–
62	–:–	–:–	02:21	21:47	–:–	–:–
60	–:–	01:10	02:45	21:23	22:56	–:–
58	–:–	01:53	03:05	21:03	22:15	–:–
56	–:–	02:20	03:21	20:47	21:48	–:–
54	01:05	02:41	03:35	20:34	21:27	23:02
52	01:44	02:58	03:46	20:22	21:10	22:24
50	02:09	03:13	03:57	20:11	20:55	21:59
45	02:53	03:42	04:19	19:50	20:27	21:15
40	03:22	04:04	04:36	19:32	20:05	20:46
35	03:45	04:21	04:51	19:18	19:47	20:24
30	04:03	04:36	05:04	19:05	19:32	20:05
20	04:32	05:01	05:25	18:44	19:08	19:37
10	04:54	05:21	05:44	18:25	18:48	19:15
0	05:12	05:38	06:01	18:08	18:30	18:57
-10	05:29	05:55	06:18	17:51	18:14	18:40
-20	05:45	06:12	06:36	17:33	17:57	18:24
-30	06:01	06:30	06:57	17:12	17:39	18:08
-35	06:09	06:41	07:09	17:00	17:28	17:60
-40	06:18	06:52	07:22	16:47	17:17	17:51
-45	06:28	07:05	07:39	16:30	17:04	17:41
-50	06:39	07:21	07:59	16:10	16:48	17:30
-52	06:44	07:28	08:08	16:01	16:41	17:25
-54	06:50	07:36	08:19	15:50	16:33	17:19
-56	06:56	07:44	08:31	15:38	16:25	17:13
-58	07:02	07:54	08:45	15:24	16:15	17:07
-60	07:09	08:06	09:02	15:07	16:04	16:60

	Moonrise			Moonset		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	03:54	–:–	–:–	00:55
68	–:–	02:27	04:42	–:–	00:15	00:06
66	01:54	03:22	05:12	23:19	23:35	23:41
64	02:35	03:55	05:35	22:45	23:11	23:25
62	03:03	04:20	05:53	22:21	22:52	23:12
60	03:24	04:39	06:08	22:01	22:37	23:01
58	03:42	04:55	06:21	21:45	22:24	22:52
56	03:56	05:09	06:32	21:31	22:12	22:43
54	04:09	05:20	06:41	21:19	22:02	22:35
52	04:20	05:31	06:50	21:08	21:53	22:29
50	04:30	05:40	06:57	20:59	21:45	22:22
45	04:51	05:59	07:14	20:39	21:28	22:09
40	05:08	06:15	07:27	20:23	21:14	21:58
35	05:23	06:29	07:38	20:09	21:02	21:48
30	05:35	06:40	07:48	19:57	20:51	21:40
20	05:56	06:60	08:05	19:36	20:33	21:25
10	06:15	07:17	08:19	19:18	20:17	21:13
0	06:32	07:33	08:33	19:01	20:02	21:01
-10	06:49	07:49	08:47	18:44	19:47	20:48
-20	07:08	08:07	09:01	18:26	19:31	20:35
-30	07:29	08:26	09:18	18:05	19:12	20:20
-35	07:42	08:38	09:28	17:53	19:01	20:12
-40	07:56	08:51	09:39	17:39	18:49	20:01
-45	08:13	09:07	09:52	17:22	18:34	19:50
-50	08:34	09:26	10:07	17:01	18:15	19:35
-52	08:44	09:35	10:14	16:51	18:07	19:28
-54	08:56	09:45	10:23	16:40	17:57	19:21
-56	09:08	09:56	10:32	16:28	17:46	19:12
-58	09:23	10:09	10:42	16:13	17:33	19:03
-60	09:41	10:24	10:54	15:55	17:19	18:52

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	04:07	04:13	12:04	12:46	00:16	1(1%)
4	04:18	04:24	12:04	13:47	01:17	2(4%)
5	04:29	04:35	12:04	14:46	02:17	3(10%)

July 06, 07 ,08 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	283°41.2	190°32.1	23°25.4	158°33.7	20°43.9	28°19.5	-22°14.0	354°46.7	-21°58.3
1	298°43.7	205°31.2	23°25.4	173°34.5	20°43.6	43°22.2	-22°13.9	9°49.3	-21°58.3
2	313°46.1	220°30.3	23°25.4	188°35.4	20°43.2	58°25.0	-22°13.9	24°52.0	-21°58.4
3	328°48.6	235°29.4	23°25.5	203°36.2	20°42.8	73°27.7	-22°13.9	39°54.7	-21°58.4
4	343°51.1	250°28.6	23°25.5	218°37.0	20°42.5	88°30.4	-22°13.9	54°57.3	-21°58.4
5	358°53.5	265°27.7	23°25.5	233°37.8	20°42.1	103°33.2	-22°13.9	69°60.0	-21°58.5
6	13°56.0	280°26.8	23°25.6	248°38.6	20°41.7	118°35.9	-22°13.8	85°02.6	-21°58.5
7	28°58.5	295°25.9	23°25.6	263°39.4	20°41.4	133°38.6	-22°13.8	100°05.3	-21°58.5
8	44°00.9	310°25.1	23°25.6	278°40.2	20°41.0	148°41.4	-22°13.8	115°08.0	-21°58.5
9	59°03.4	325°24.2	23°25.6	293°41.0	20°40.6	163°44.1	-22°13.8	130°10.6	-21°58.6
10	74°05.9	340°23.3	23°25.7	308°41.8	20°40.3	178°46.8	-22°13.8	145°13.3	-21°58.6
11	89°08.3	355°22.4	23°25.7	323°42.7	20°39.9	193°49.6	-22°13.8	160°15.9	-21°58.6
12	104°10.8	10°21.6	23°25.7	338°43.5	20°39.5	208°52.3	-22°13.7	175°18.6	-21°58.6
13	119°13.3	25°20.7	23°25.7	353°44.3	20°39.2	223°55.0	-22°13.7	190°21.3	-21°58.7
14	134°15.7	40°19.8	23°25.7	8°45.1	20°38.8	238°57.8	-22°13.7	205°23.9	-21°58.7
15	149°18.2	55°18.9	23°25.8	23°45.9	20°38.4	254°00.5	-22°13.7	220°26.6	-21°58.7
16	164°20.6	70°18.1	23°25.8	38°46.7	20°38.1	269°03.2	-22°13.7	235°29.2	-21°58.8
17	179°23.1	85°17.2	23°25.8	53°47.5	20°37.7	284°06.0	-22°13.7	250°31.9	-21°58.8
18	194°25.6	100°16.3	23°25.8	68°48.3	20°37.3	299°08.7	-22°13.6	265°34.6	-21°58.8
19	209°28.0	115°15.4	23°25.8	83°49.1	20°37.0	314°11.4	-22°13.6	280°37.2	-21°58.8
20	224°30.5	130°14.6	23°25.8	98°50.0	20°36.6	329°14.2	-22°13.6	295°39.9	-21°58.9
21	239°33.0	145°13.7	23°25.8	113°50.8	20°36.2	344°16.9	-22°13.6	310°42.5	-21°58.9
22	254°35.4	160°12.8	23°25.8	128°51.6	20°35.9	359°19.6	-22°13.6	325°45.2	-21°58.9
23	269°37.9	175°11.9	23°25.9	143°52.4	20°35.5	14°22.4	-22°13.5	340°47.9	-21°58.9
Mer.pass.:5:04:		v-0.9 d0.0 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	284°40.4	190°11.1	23°25.9	158°53.2	20°35.1	29°25.1	-22°13.5	355°50.5	-21°59.0
1	299°42.8	205°10.2	23°25.9	173°54.0	20°34.8	44°27.8	-22°13.5	10°53.2	-21°59.0
2	314°45.3	220°09.3	23°25.9	188°54.8	20°34.4	59°30.5	-22°13.5	25°55.8	-21°59.0
3	329°47.7	235°08.4	23°25.9	203°55.7	20°34.0	74°33.3	-22°13.5	40°58.5	-21°59.1
4	344°50.2	250°07.6	23°25.9	218°56.5	20°33.6	89°36.0	-22°13.5	56°01.2	-21°59.1
5	359°52.7	265°06.7	23°25.9	233°57.3	20°33.3	104°38.7	-22°13.4	71°03.8	-21°59.1
6	14°55.1	280°05.8	23°25.9	248°58.1	20°32.9	119°41.5	-22°13.4	86°06.5	-21°59.1
7	29°57.6	295°04.9	23°25.9	263°58.9	20°32.5	134°44.2	-22°13.4	101°09.1	-21°59.2
8	45°00.1	310°04.1	23°25.9	278°59.7	20°32.1	149°46.9	-22°13.4	116°11.8	-21°59.2
9	60°02.5	325°03.2	23°25.9	294°00.5	20°31.8	164°49.7	-22°13.4	131°14.5	-21°59.2
10	75°05.0	340°02.3	23°25.9	309°01.4	20°31.4	179°52.4	-22°13.4	146°17.1	-21°59.2
11	90°07.5	355°01.4	23°25.9	324°02.2	20°31.0	194°55.1	-22°13.3	161°19.8	-21°59.3
12	105°09.9	10°00.5	23°25.8	339°03.0	20°30.7	209°57.8	-22°13.3	176°22.4	-21°59.3
13	120°12.4	24°59.7	23°25.8	354°03.8	20°30.3	225°00.6	-22°13.3	191°25.1	-21°59.3
14	135°14.9	39°58.8	23°25.8	9°04.6	20°29.9	240°03.3	-22°13.3	206°27.8	-21°59.4
15	150°17.3	54°57.9	23°25.8	24°05.4	20°29.5	255°06.0	-22°13.3	221°30.4	-21°59.4
16	165°19.8	69°57.0	23°25.8	39°06.3	20°29.2	270°08.7	-22°13.2	236°33.1	-21°59.4
17	180°22.2	84°56.2	23°25.8	54°07.1	20°28.8	285°11.5	-22°13.2	251°35.7	-21°59.4
18	195°24.7	99°55.3	23°25.8	69°07.9	20°28.4	300°14.2	-22°13.2	266°38.4	-21°59.5
19	210°27.2	114°54.4	23°25.8	84°08.7	20°28.0	315°16.9	-22°13.2	281°41.1	-21°59.5
20	225°29.6	129°53.5	23°25.7	99°09.5	20°27.7	330°19.7	-22°13.2	296°43.7	-21°59.5
21	240°32.1	144°52.7	23°25.7	114°10.3	20°27.3	345°22.4	-22°13.2	311°46.4	-21°59.5
22	255°34.6	159°51.8	23°25.7	129°11.1	20°26.9	0°25.1	-22°13.1	326°49.1	-21°59.6
23	270°37.0	174°50.9	23°25.7	144°12.0	20°26.5	15°27.8	-22°13.1	341°51.7	-21°59.6
Mer.pass.:5:00:		v-0.9 d0.0 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	285°39.5	189°50.0	23°25.7	159°12.8	20°26.2	30°30.6	-22°13.1	356°54.4	-21°59.6
1	300°42.0	204°49.2	23°25.6	174°13.6	20°25.8	45°33.3	-22°13.1	11°57.0	-21°59.6
2	315°44.4	219°48.3	23°25.6	189°14.4	20°25.4	60°36.0	-22°13.1	26°59.7	-21°59.7
3	330°46.9	234°47.4	23°25.6	204°15.2	20°25.0	75°38.7	-22°13.1	42°02.4	-21°59.7
4	345°49.3	249°46.5	23°25.6	219°16.1	20°24.7	90°41.5	-22°13.0	57°05.0	-21°59.7
5	0°51.8	264°45.7	23°25.5	234°16.9	20°24.3	105°44.2	-22°13.0	72°07.7	-21°59.8
6	15°54.3	279°44.8	23°25.5	249°17.7	20°23.9	120°46.9	-22°13.0	87°10.3	-21°59.8
7	30°56.7	294°43.9	23°25.5	264°18.5	20°23.5	135°49.6	-22°13.0	102°13.0	-21°59.8
8	45°59.2	309°43.0	23°25.4	279°19.3	20°23.1	150°52.3	-22°13.0	117°15.7	-21°59.8
9	61°01.7	324°42.2	23°25.4	294°20.1	20°22.8	165°55.1	-22°13.0	132°18.3	-21°59.9
10	76°04.1	339°41.3	23°25.4	309°21.0	20°22.4	180°57.8	-22°12.9	147°21.0	-21°59.9
11	91°06.6	354°40.4	23°25.3	324°21.8	20°22.0	196°00.5	-22°12.9	162°23.6	-21°59.9
12	106°09.1	9°39.5	23°25.3	339°22.6	20°21.6	211°03.2	-22°12.9	177°26.3	-21°59.9
13	121°11.5	24°38.7	23°25.3	354°23.4	20°21.2	226°06.0	-22°12.9	192°29.0	-21°60.0
14	136°14.0	39°37.8	23°25.2	9°24.2	20°20.9	241°08.7	-22°12.9	207°31.6	-22°00.0
15	151°16.5	54°36.9	23°25.2	24°25.1	20°20.5	256°11.4	-22°12.9	222°34.3	-22°00.0
16	166°18.9	69°36.0	23°25.1	39°25.9	20°20.1	271°14.1	-22°12.8	237°36.9	-22°00.1
17	181°21.4	84°35.2	23°25.1	54°26.7	20°19.7	286°16.8	-22°12.8	252°39.6	-22°00.1
18	196°23.8	99°34.3	23°25.1	69°27.5	20°19.3	301°19.6	-22°12.8	267°42.3	-22°00.1
19	211°26.3	114°33.4	23°25.0	84°28.3	20°19.0	316°22.3	-22°12.8	282°44.9	-22°00.1
20	226°28.8	129°32.5	23°25.0	99°29.2	20°18.6	331°25.0	-22°12.8	297°47.6	-22°00.2
21	241°31.2	144°31.6	23°24.9	114°30.0	20°18.2	346°27.7	-22°12.7	312°50.2	-22°00.2
22	256°33.7	159°30.8	23°24.9	129°30.8	20°17.8	1°30.4	-22°12.7	327°52.9	-22°00.2
23	271°36.2	174°29.9	23°24.8	144°31.6	20°17.4	16°33.2	-22°12.7	342°55.6	-22°00.2
Mer.pass.:4:56:		v-0.9 d-0.0 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Stars

	SHA	Dec
Alpheratz	357°39.1	29°11.7
Ankaa	353°11.5	-42°11.9
Schedar	349°35.8	56°38.3
Diphda	348°51.6	-17°52.8
Achernar	335°23.8	-57°08.1
Hamal	327°56.2	23°33.0
Polaris	316°12.4	89°20.4
Akamar	315°15.4	-40°13.5
Menkar	314°10.9	4°09.8
Mirfak	308°34.7	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.8	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.7	28°37.3
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.2	7°24.5
Canopus	263°54.9	-52°42.4
Sirius	258°30.3	-16°44.5
Adara	255°09.7	-28°60.0
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°17.0	-59°34.4
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.7	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°46.9	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°39.0
Acrux	173°04.8	-63°12.6
Gacrux	171°56.3	-57°13.5
Alioth	166°17.1	55°51.7
Spica	158°26.8	-11°15.7
Alcaid	152°55.5	49°13.4
Hadar	148°41.8	-60°28.1
Menkent	148°02.6	-36°28.0
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.8	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.5	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.4
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.2
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.2
Peacock	53°12.1	-56°40.1
Deneb	49°28.2	45°20.9
Enif	33°42.8	9°57.9
Alnair	27°38.2	-46°51.8
Fomalhaut	15°19.3	-29°31.0
Scheat	13°49.2	28°11.1
Markab	13°34.1	15°18.5

2019/7/6	SHA	Mer.pass
Venus	266°50.8	11:19
Mars	234°52.5	13:25
Jupiter	104°38.3	22:03
Saturn	71°05.5	00:21

2019/7/7	SHA	Mer.pass
Venus	265°30.7	11:20
Mars	234°12.9	13:24
Jupiter	104°44.7	21:58
Saturn	71°10.2	00:17

2019/7/8	SHA	Mer.pass
Venus	264°10.5	11:21
Mars	233°33.3	13:22
Jupiter	104°51.1	21:54
Saturn	71°14.9	00:12

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°50.1	22°44.0	132°58.9	6.9	15°34.8	-10.3	60.2
1	193°50.0	22°43.8	147°24.8	7.0	15°24.5	-10.4	60.2
2	208°49.9	22°43.5	161°50.9	7.1	15°14.1	-10.5	60.2
3	223°49.7	22°43.3	176°17.0	7.1	15°03.6	-10.6	60.2
4	238°49.6	22°43.0	190°43.1	7.2	14°53.0	-10.6	60.2
5	253°49.5	22°42.8	205°09.4	7.3	14°42.3	-10.7	60.2
6	268°49.4	22°42.5	219°35.7	7.4	14°31.5	-10.8	60.2
7	283°49.3	22°42.3	234°02.1	7.4	14°20.6	-10.9	60.2
8	298°49.2	22°42.1	248°28.6	7.5	14°09.7	-11.0	60.1
9	313°49.1	22°41.8	262°55.1	7.6	13°58.6	-11.1	60.1
10	328°49.0	22°41.6	277°21.7	7.6	13°47.5	-11.2	60.1
11	343°48.9	22°41.3	291°48.4	7.7	13°36.3	-11.2	60.1
12	358°48.8	22°41.1	306°15.1	7.8	13°25.0	-11.3	60.1
13	13°48.7	22°40.8	320°42.0	7.9	13°13.7	-11.4	60.1
14	28°48.6	22°40.6	335°08.9	7.9	13°02.2	-11.5	60.1
15	43°48.5	22°40.3	349°35.8	8.0	12°50.7	-11.6	60.1
16	58°48.4	22°40.0	4°02.9	8.1	12°39.1	-11.6	60.1
17	73°48.3	22°39.8	18°30.0	8.1	12°27.4	-11.7	60.1
18	88°48.2	22°39.5	32°57.1	8.2	12°15.7	-11.8	60.0
19	103°48.1	22°39.3	47°24.4	8.3	12°03.9	-11.8	60.0
20	118°48.0	22°39.0	61°51.7	8.3	11°52.0	-11.9	60.0
21	133°47.9	22°38.8	76°19.1	8.4	11°40.1	-12.0	60.0
22	148°47.7	22°38.5	90°46.5	8.5	11°28.1	-12.0	60.0
23	163°47.6	22°38.2	105°14.1	8.6	11°16.0	-12.1	60.0
	SD.=15.7	d=-0.2			S.D.=16.4		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°47.5	22°38.0	119°41.6	8.6	11°03.9	-12.2	60.0
1	193°47.4	22°37.7	134°09.3	8.7	10°51.7	-12.2	59.9
2	208°47.3	22°37.5	148°37.0	8.8	10°39.5	-12.3	59.9
3	223°47.2	22°37.2	163°04.8	8.8	10°27.1	-12.3	59.9
4	238°47.1	22°36.9	177°32.7	8.9	10°14.8	-12.4	59.9
5	253°47.0	22°36.7	192°00.6	8.9	10°02.4	-12.4	59.9
6	268°46.9	22°36.4	206°28.6	9.0	9°49.9	-12.5	59.9
7	283°46.8	22°36.2	220°56.6	9.1	9°37.4	-12.5	59.9
8	298°46.7	22°35.9	235°24.7	9.1	9°24.8	-12.6	59.8
9	313°46.6	22°35.6	249°52.9	9.2	9°12.2	-12.6	59.8
10	328°46.5	22°35.4	264°21.1	9.3	8°59.6	-12.7	59.8
11	343°46.4	22°35.1	278°49.4	9.3	8°46.9	-12.7	59.8
12	358°46.3	22°34.8	293°17.8	9.4	8°34.1	-12.8	59.8
13	13°46.2	22°34.6	307°46.2	9.4	8°21.3	-12.8	59.8
14	28°46.1	22°34.3	322°14.6	9.5	8°08.5	-12.8	59.7
15	43°46.0	22°34.0	336°43.2	9.6	7°55.6	-12.9	59.7
16	58°45.9	22°33.8	351°11.8	9.6	7°42.7	-12.9	59.7
17	73°45.8	22°33.5	5°40.4	9.7	7°29.8	-13.0	59.7
18	88°45.7	22°33.2	20°09.1	9.7	7°16.8	-13.0	59.7
19	103°45.6	22°32.9	34°37.9	9.8	7°03.8	-13.0	59.6
20	118°45.5	22°32.7	49°06.7	9.8	6°50.8	-13.1	59.6
21	133°45.4	22°32.4	63°35.5	9.9	6°37.7	-13.1	59.6
22	148°45.3	22°32.1	78°04.4	9.9	6°24.6	-13.1	59.6
23	163°45.2	22°31.8	92°33.4	10.0	6°11.5	-13.1	59.6
	SD.=15.7	d=-0.3			S.D.=16.4		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°45.1	22°31.6	107°02.4	10.0	5°58.3	-13.2	59.5
1	193°45.0	22°31.3	121°31.5	10.1	5°45.1	-13.2	59.5
2	208°44.9	22°31.0	136°00.6	10.1	5°31.9	-13.2	59.5
3	223°44.8	22°30.7	150°29.8	10.2	5°18.7	-13.2	59.5
4	238°44.7	22°30.5	164°59.0	10.2	5°05.5	-13.3	59.5
5	253°44.6	22°30.2	179°28.2	10.3	4°52.2	-13.3	59.4
6	268°44.5	22°29.9	193°57.5	10.3	4°38.9	-13.3	59.4
7	283°44.4	22°29.6	208°26.9	10.4	4°25.7	-13.3	59.4
8	298°44.3	22°29.3	222°56.3	10.4	4°12.3	-13.3	59.4
9	313°44.2	22°29.1	237°25.7	10.5	3°59.0	-13.3	59.4
10	328°44.1	22°28.8	251°55.2	10.5	3°45.7	-13.3	59.3
11	343°44.0	22°28.5	266°24.7	10.5	3°32.3	-13.3	59.3
12	358°43.9	22°28.2	280°54.3	10.6	3°19.0	-13.4	59.3
13	13°43.8	22°27.9	295°23.9	10.6	3°05.6	-13.4	59.3
14	28°43.7	22°27.6	309°53.5	10.7	2°52.3	-13.4	59.3
15	43°43.6	22°27.4	324°23.2	10.7	2°38.9	-13.4	59.2
16	58°43.5	22°27.1	338°52.9	10.7	2°25.5	-13.4	59.2
17	73°43.4	22°26.8	353°22.6	10.8	2°12.1	-13.4	59.2
18	88°43.4	22°26.5	7°52.4	10.8	1°58.7	-13.4	59.2
19	103°43.3	22°26.2	22°22.2	10.8	1°45.4	-13.4	59.2
20	118°43.2	22°25.9	36°52.1	10.9	1°32.0	-13.4	59.1
21	133°43.1	22°25.6	51°22.0	10.9	1°18.6	-13.4	59.1
22	148°43.0	22°25.3	65°51.9	10.9	1°05.2	-13.4	59.1
23	163°42.9	22°25.1	80°21.8	11.0	0°51.8	-13.4	59.1
	SD.=15.7	d=-0.3			S.D.=16.2		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	00:57	23:09	–:–	–:–
64	–:–	–:–	01:53	22:15	–:–	–:–
62	–:–	–:–	02:26	21:43	–:–	–:–
60	–:–	01:19	02:49	21:19	22:48	–:–
58	–:–	01:58	03:08	21:01	22:10	–:–
56	–:–	02:24	03:24	20:45	21:44	–:–
54	01:12	02:45	03:37	20:32	21:24	22:55
52	01:49	03:02	03:49	20:20	21:08	22:20
50	02:13	03:16	03:59	20:10	20:53	21:56
45	02:56	03:44	04:21	19:49	20:25	21:14
40	03:25	04:06	04:38	19:32	20:04	20:45
35	03:47	04:23	04:52	19:17	19:47	20:23
30	04:05	04:38	05:05	19:05	19:32	20:05
20	04:33	05:02	05:26	18:44	19:08	19:37
10	04:55	05:21	05:44	18:25	18:48	19:15
0	05:13	05:39	06:01	18:09	18:31	18:57
-10	05:29	05:55	06:18	17:52	18:15	18:41
-20	05:45	06:12	06:36	17:34	17:58	18:25
-30	06:00	06:30	06:56	17:14	17:40	18:10
-35	06:09	06:40	07:08	17:02	17:30	18:01
-40	06:18	06:51	07:22	16:48	17:19	17:52
-45	06:27	07:04	07:38	16:32	17:06	17:43
-50	06:38	07:20	07:57	16:13	16:51	17:32
-52	06:43	07:27	08:07	16:03	16:43	17:27
-54	06:49	07:34	08:17	15:53	16:36	17:21
-56	06:54	07:43	08:29	15:41	16:27	17:16
-58	07:01	07:53	08:43	15:27	16:18	17:09
-60	07:08	08:03	08:59	15:11	16:07	17:02

Lat.	Moonrise			Moonset		
	Sat	Sun	Mon	Sat	Sun	Mon
72	05:53	08:20	10:30	00:58	00:26	00:05
70	06:25	08:35	10:35	00:25	00:09	23:46
68	06:48	08:47	10:39	00:00	23:50	23:45
66	07:06	08:57	10:43	23:44	23:45	23:45
64	07:21	09:05	10:46	23:34	23:40	23:44
62	07:33	09:12	10:48	23:26	23:36	23:44
60	07:43	09:18	10:50	23:19	23:32	23:44
58	07:52	09:23	10:52	23:12	23:29	23:43
56	07:59	09:28	10:54	23:07	23:26	23:43
54	08:06	09:32	10:56	23:02	23:23	23:43
52	08:13	09:36	10:57	22:57	23:21	23:43
50	08:18	09:39	10:58	22:53	23:19	23:42
45	08:30	09:46	11:01	22:44	23:14	23:42
40	08:40	09:53	11:03	22:36	23:10	23:42
35	08:48	09:58	11:05	22:30	23:07	23:41
30	08:56	10:02	11:07	22:24	23:04	23:41
20	09:09	10:10	11:10	22:14	22:58	23:40
10	09:20	10:18	11:13	22:05	22:53	23:40
0	09:30	10:24	11:15	21:56	22:49	23:39
-10	09:40	10:31	11:18	21:48	22:44	23:39
-20	09:51	10:38	11:21	21:38	22:39	23:38
-30	10:04	10:46	11:24	21:28	22:34	23:37
-35	10:11	10:50	11:26	21:22	22:30	23:37
-40	10:19	10:55	11:28	21:15	22:26	23:37
-45	10:29	11:01	11:30	21:06	22:22	23:36
-50	10:41	11:08	11:33	20:57	22:17	23:35
-52	10:46	11:12	11:34	20:52	22:14	23:35
-54	10:52	11:15	11:35	20:47	22:12	23:35
-56	10:58	11:19	11:37	20:41	22:09	23:34
-58	11:05	11:23	11:39	20:35	22:05	23:34
-60	11:14	11:28	11:40	20:27	22:02	23:33

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	04:40	04:45	12:04	15:43	03:15	4(18%)
7	04:50	04:55	12:04	16:36	04:10	5(28%)
8	05:00	05:04	12:05	17:27	05:02	6(39%)

July 09, 10 ,11 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	286°38.6	189°29.0	23°24.8	159°32.4	20°17.1	31°35.9	-22°12.7	357°58.2	-22°00.3
1	301°41.1	204°28.1	23°24.7	174°33.3	20°16.7	46°38.6	-22°12.7	13°00.9	-22°00.3
2	316°43.6	219°27.3	23°24.7	189°34.1	20°16.3	61°41.3	-22°12.7	28°03.6	-22°00.3
3	331°46.0	234°26.4	23°24.6	204°34.9	20°15.9	76°44.0	-22°12.6	43°06.2	-22°00.4
4	346°48.5	249°25.5	23°24.6	219°35.7	20°15.5	91°46.8	-22°12.6	58°08.9	-22°00.4
5	1°51.0	264°24.6	23°24.5	234°36.5	20°15.1	106°49.5	-22°12.6	73°11.5	-22°00.4
6	16°53.4	279°23.8	23°24.4	249°37.4	20°14.8	121°52.2	-22°12.6	88°14.2	-22°00.4
7	31°55.9	294°22.9	23°24.4	264°38.2	20°14.4	136°54.9	-22°12.6	103°16.9	-22°00.5
8	46°58.3	309°22.0	23°24.3	279°39.0	20°14.0	151°57.6	-22°12.6	118°19.5	-22°00.5
9	62°00.8	324°21.1	23°24.3	294°39.8	20°13.6	167°00.3	-22°12.5	133°22.2	-22°00.5
10	77°03.3	339°20.3	23°24.2	309°40.6	20°13.2	182°03.1	-22°12.5	148°24.8	-22°00.5
11	92°05.7	354°19.4	23°24.1	324°41.5	20°12.8	197°05.8	-22°12.5	163°27.5	-22°00.6
12	107°08.2	9°18.5	23°24.1	339°42.3	20°12.5	212°08.5	-22°12.5	178°30.2	-22°00.6
13	122°10.7	24°17.6	23°24.0	354°43.1	20°12.1	227°11.2	-22°12.5	193°32.8	-22°00.6
14	137°13.1	39°16.8	23°23.9	9°43.9	20°11.7	242°13.9	-22°12.5	208°35.5	-22°00.7
15	152°15.6	54°15.9	23°23.9	24°44.8	20°11.3	257°16.6	-22°12.4	223°38.1	-22°00.7
16	167°18.1	69°15.0	23°23.8	39°45.6	20°10.9	272°19.4	-22°12.4	238°40.8	-22°00.7
17	182°20.5	84°14.1	23°23.7	54°46.4	20°10.5	287°22.1	-22°12.4	253°43.5	-22°00.7
18	197°23.0	99°13.3	23°23.6	69°47.2	20°10.1	302°24.8	-22°12.4	268°46.1	-22°00.8
19	212°25.4	114°12.4	23°23.6	84°48.1	20°09.8	317°27.5	-22°12.4	283°48.8	-22°00.8
20	227°27.9	129°11.5	23°23.5	99°48.9	20°09.4	332°30.2	-22°12.4	298°51.4	-22°00.8
21	242°30.4	144°10.6	23°23.4	114°49.7	20°09.0	347°32.9	-22°12.3	313°54.1	-22°00.8
22	257°32.8	159°09.8	23°23.3	129°50.5	20°08.6	2°35.6	-22°12.3	328°56.8	-22°00.9
23	272°35.3	174°08.9	23°23.3	144°51.3	20°08.2	17°38.4	-22°12.3	343°59.4	-22°00.9
Mer.pass.:4:52:		v-0.9 d-0.1 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	287°37.8	189°08.0	23°23.2	159°52.2	20°07.8	32°41.1	-22°12.3	359°02.1	-22°00.9
1	302°40.2	204°07.1	23°23.1	174°53.0	20°07.4	47°43.8	-22°12.3	14°04.8	-22°00.9
2	317°42.7	219°06.3	23°23.0	189°53.8	20°07.0	62°46.5	-22°12.3	29°07.4	-22°01.0
3	332°45.2	234°05.4	23°22.9	204°54.6	20°06.6	77°49.2	-22°12.3	44°10.1	-22°01.0
4	347°47.6	249°04.5	23°22.9	219°55.5	20°06.3	92°51.9	-22°12.2	59°12.7	-22°01.0
5	2°50.1	264°03.6	23°22.8	234°56.3	20°05.9	107°54.6	-22°12.2	74°15.4	-22°01.1
6	17°52.6	279°02.8	23°22.7	249°57.1	20°05.5	122°57.3	-22°12.2	89°18.1	-22°01.1
7	32°55.0	294°01.9	23°22.6	264°57.9	20°05.1	138°00.1	-22°12.2	104°20.7	-22°01.1
8	47°57.5	309°01.0	23°22.5	279°58.8	20°04.7	153°02.8	-22°12.2	119°23.4	-22°01.1
9	62°59.9	324°00.1	23°22.4	294°59.6	20°04.3	168°05.5	-22°12.2	134°26.0	-22°01.2
10	78°02.4	338°59.3	23°22.3	310°00.4	20°03.9	183°08.2	-22°12.1	149°28.7	-22°01.2
11	93°04.9	353°58.4	23°22.2	325°01.2	20°03.5	198°10.9	-22°12.1	164°31.4	-22°01.2
12	108°07.3	8°57.5	23°22.1	340°02.1	20°03.1	213°13.6	-22°12.1	179°34.0	-22°01.2
13	123°09.8	23°56.6	23°22.0	355°02.9	20°02.7	228°16.3	-22°12.1	194°36.7	-22°01.3
14	138°12.3	38°55.8	23°21.9	10°03.7	20°02.4	243°19.0	-22°12.1	209°39.3	-22°01.3
15	153°14.7	53°54.9	23°21.8	25°04.5	20°02.0	258°21.7	-22°12.1	224°42.0	-22°01.3
16	168°17.2	68°54.0	23°21.7	40°05.4	20°01.6	273°24.4	-22°12.0	239°44.7	-22°01.4
17	183°19.7	83°53.1	23°21.6	55°06.2	20°01.2	288°27.2	-22°12.0	254°47.3	-22°01.4
18	198°22.1	98°52.3	23°21.5	70°07.0	20°00.8	303°29.9	-22°12.0	269°50.0	-22°01.4
19	213°24.6	113°51.4	23°21.4	85°07.9	20°00.4	318°32.6	-22°12.0	284°52.6	-22°01.4
20	228°27.1	128°50.5	23°21.3	100°08.7	20°00.0	333°35.3	-22°12.0	299°55.3	-22°01.5
21	243°29.5	143°49.7	23°21.2	115°09.5	19°59.6	348°38.0	-22°12.0	314°58.0	-22°01.5
22	258°32.0	158°48.8	23°21.1	130°10.3	19°59.2	3°40.7	-22°11.9	330°00.6	-22°01.5
23	273°34.4	173°47.9	23°21.0	145°11.2	19°58.8	18°43.4	-22°11.9	345°03.3	-22°01.5
Mer.pass.:4:48:		v-0.9 d-0.1 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	288°36.9	188°47.0	23°20.9	160°12.0	19°58.4	33°46.1	-22°11.9	0°06.0	-22°01.6
1	303°39.4	203°46.2	23°20.8	175°12.8	19°58.0	48°48.8	-22°11.9	15°08.6	-22°01.6
2	318°41.8	218°45.3	23°20.7	190°13.6	19°57.6	63°51.5	-22°11.9	30°11.3	-22°01.6
3	333°44.3	233°44.4	23°20.6	205°14.5	19°57.2	78°54.2	-22°11.9	45°13.9	-22°01.6
4	348°46.8	248°43.5	23°20.5	220°15.3	19°56.9	93°56.9	-22°11.8	60°16.6	-22°01.7
5	3°49.2	263°42.7	23°20.4	235°16.1	19°56.5	108°59.6	-22°11.8	75°19.3	-22°01.7
6	18°51.7	278°41.8	23°20.2	250°17.0	19°56.1	124°02.3	-22°11.8	90°21.9	-22°01.7
7	33°54.2	293°40.9	23°20.1	265°17.8	19°55.7	139°05.0	-22°11.8	105°24.6	-22°01.8
8	48°56.6	308°40.0	23°20.0	280°18.6	19°55.3	154°07.8	-22°11.8	120°27.2	-22°01.8
9	63°59.1	323°39.2	23°19.9	295°19.4	19°54.9	169°10.5	-22°11.8	135°29.9	-22°01.8
10	79°01.5	338°38.3	23°19.8	310°20.3	19°54.5	184°13.2	-22°11.8	150°32.6	-22°01.8
11	94°04.0	353°37.4	23°19.6	325°21.1	19°54.1	199°15.9	-22°11.7	165°35.2	-22°01.9
12	109°06.5	8°36.6	23°19.5	340°21.9	19°53.7	214°18.6	-22°11.7	180°37.9	-22°01.9
13	124°08.9	23°35.7	23°19.4	355°22.8	19°53.3	229°21.3	-22°11.7	195°40.5	-22°01.9
14	139°11.4	38°34.8	23°19.3	10°23.6	19°52.9	244°24.0	-22°11.7	210°43.2	-22°01.9
15	154°13.9	53°33.9	23°19.1	25°24.4	19°52.5	259°26.7	-22°11.7	225°45.9	-22°02.0
16	169°16.3	68°33.1	23°19.0	40°25.2	19°52.1	274°29.4	-22°11.7	240°48.5	-22°02.0
17	184°18.8	83°32.2	23°18.9	55°26.1	19°51.7	289°32.1	-22°11.6	255°51.2	-22°02.0
18	199°21.3	98°31.3	23°18.8	70°26.9	19°51.3	304°34.8	-22°11.6	270°53.8	-22°02.1
19	214°23.7	113°30.4	23°18.6	85°27.7	19°50.9	319°37.5	-22°11.6	285°56.5	-22°02.1
20	229°26.2	128°29.6	23°18.5	100°28.6	19°50.5	334°40.2	-22°11.6	300°59.2	-22°02.1
21	244°28.7	143°28.7	23°18.4	115°29.4	19°50.1	349°42.9	-22°11.6	316°01.8	-22°02.1
22	259°31.1	158°27.8	23°18.2	130°30.2	19°49.7	4°45.6	-22°11.6	331°04.5	-22°02.2
23	274°33.6	173°27.0	23°18.1	145°31.1	19°49.3	19°48.3	-22°11.6	346°07.1	-22°02.2
Mer.pass.:4:44:		v-0.9 d-0.1 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Stars

	SHA	Dec
Alpheratz	357°39.1	29°11.7
Ankaa	353°11.5	-42°11.9
Schedar	349°35.7	56°38.3
Diphda	348°51.6	-17°52.8
Achernar	335°23.8	-57°08.1
Hamal	327°56.2	23°33.0
Polaris	316°11.1	89°20.4
Akamar	315°15.4	-40°13.5
Menkar	314°10.9	4°09.8
Mirfak	308°34.7	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.8	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.7	28°37.3
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.9	-52°42.4
Sirius	258°30.3	-16°44.5
Adara	255°09.7	-28°60.0
Procyon	244°55.7	5°10.6
Pollux	243°23.0	27°58.7
Avior	234°17.0	-59°34.4
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.7	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°47.0	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°39.0
Acrux	173°04.8	-63°12.6
Gacrux	171°56.4	-57°13.5
Alioth	166°17.1	55°51.7
Spica	158°26.8	-11°15.7
Alcaid	152°55.5	49°13.4
Hadar	148°41.8	-60°28.1
Menkent	148°02.6	-36°28.0
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.8	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.5	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.4	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.4
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.2
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.2
Peacock	53°12.1	-56°40.1
Deneb	49°28.2	45°20.9
Enif	33°42.8	9°57.9
Alnair	27°38.2	-46°51.8
Fomalhaut	15°19.3	-29°31.0
Scheat	13°49.2	28°11.1
Markab	13°34.0	15°18.5

2019/7/9	SHA	Mer.pass
Venus	262°50.4	11:23
Mars	232°53.8	13:21
Jupiter	104°57.3	21:50
Saturn	71°19.6	00:08

2019/7/1	SHA	Mer.pass
Venus	261°30.2	11:24
Mars	232°14.4	13:20
Jupiter	105°03.3	21:45
Saturn	71°24.3	00:04

2019/7/1	SHA	Mer.pass
Venus	260°10.1	11:26
Mars	231°35.1	13:18
Jupiter	105°09.2	21:41
Saturn	71°29.0	23:55

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°42.8	22°24.8	94°51.8	11.0	0°38.5	-13.4	59.0
1	193°42.7	22°24.5	109°21.8	11.0	0°25.1	-13.4	59.0
2	208°42.6	22°24.2	123°51.8	11.0	0°11.7	-13.3	59.0
3	223°42.5	22°23.9	138°21.9	11.1	-0°01.6	-13.3	59.0
4	238°42.4	22°23.6	152°51.9	11.1	-0°14.9	-13.3	58.9
5	253°42.3	22°23.3	167°22.0	11.1	-0°28.2	-13.3	58.9
6	268°42.2	22°23.0	181°52.2	11.1	-0°41.6	-13.3	58.9
7	283°42.1	22°22.7	196°22.3	11.2	-0°54.9	-13.3	58.9
8	298°42.0	22°22.4	210°52.5	11.2	-1°08.1	-13.3	58.9
9	313°41.9	22°22.1	225°22.7	11.2	-1°21.4	-13.3	58.8
10	328°41.8	22°21.8	239°52.9	11.2	-1°34.6	-13.2	58.8
11	343°41.7	22°21.5	254°23.1	11.2	-1°47.9	-13.2	58.8
12	358°41.7	22°21.2	268°53.3	11.3	-2°01.1	-13.2	58.8
13	13°41.6	22°20.9	283°23.6	11.3	-2°14.3	-13.2	58.7
14	28°41.5	22°20.6	297°53.9	11.3	-2°27.4	-13.2	58.7
15	43°41.4	22°20.3	312°24.2	11.3	-2°40.6	-13.1	58.7
16	58°41.3	22°20.0	326°54.5	11.3	-2°53.7	-13.1	58.7
17	73°41.2	22°19.7	341°24.8	11.3	-3°06.8	-13.1	58.6
18	88°41.1	22°19.4	355°55.1	11.3	-3°19.8	-13.0	58.6
19	103°41.0	22°19.1	10°25.5	11.3	-3°32.9	-13.0	58.6
20	118°40.9	22°18.8	24°55.8	11.4	-3°45.9	-13.0	58.6
21	133°40.8	22°18.5	39°26.2	11.4	-3°58.8	-13.0	58.6
22	148°40.7	22°18.2	53°56.6	11.4	-4°11.8	-12.9	58.5
23	163°40.6	22°17.9	68°27.0	11.4	-4°24.7	-12.9	58.5
	SD.=15.7	d=-0.3			S.D.=16.1		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°40.6	22°17.6	82°57.3	11.4	-4°37.6	-12.9	58.5
1	193°40.5	22°17.3	97°27.7	11.4	-4°50.4	-12.8	58.5
2	208°40.4	22°16.9	111°58.1	11.4	-5°03.2	-12.8	58.4
3	223°40.3	22°16.6	126°28.5	11.4	-5°16.0	-12.8	58.4
4	238°40.2	22°16.3	140°58.9	11.4	-5°28.7	-12.7	58.4
5	253°40.1	22°16.0	155°29.4	11.4	-5°41.4	-12.7	58.4
6	268°40.0	22°15.7	169°59.8	11.4	-5°54.1	-12.6	58.3
7	283°39.9	22°15.4	184°30.2	11.4	-6°06.7	-12.6	58.3
8	298°39.8	22°15.1	199°00.6	11.4	-6°19.3	-12.6	58.3
9	313°39.8	22°14.8	213°31.0	11.4	-6°31.8	-12.5	58.3
10	328°39.7	22°14.5	228°01.4	11.4	-6°44.3	-12.5	58.2
11	343°39.6	22°14.1	242°31.8	11.4	-6°56.7	-12.4	58.2
12	358°39.5	22°13.8	257°02.2	11.4	-7°09.1	-12.4	58.2
13	13°39.4	22°13.5	271°32.6	11.4	-7°21.5	-12.3	58.2
14	28°39.3	22°13.2	286°03.0	11.4	-7°33.8	-12.3	58.1
15	43°39.2	22°12.9	300°33.4	11.4	-7°46.1	-12.2	58.1
16	58°39.1	22°12.6	315°03.8	11.4	-7°58.3	-12.2	58.1
17	73°39.0	22°12.2	329°34.2	11.4	-8°10.4	-12.1	58.1
18	88°39.0	22°11.9	344°04.6	11.4	-8°22.5	-12.1	58.0
19	103°38.9	22°11.6	358°35.0	11.4	-8°34.6	-12.0	58.0
20	118°38.8	22°11.3	13°05.3	11.4	-8°46.6	-12.0	58.0
21	133°38.7	22°11.0	27°35.7	11.3	-8°58.5	-11.9	58.0
22	148°38.6	22°10.6	42°06.0	11.3	-9°10.4	-11.9	58.0
23	163°38.5	22°10.3	56°36.3	11.3	-9°22.2	-11.8	57.9
	SD.=15.7	d=-0.3			S.D.=16.0		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°38.4	22°10.0	71°06.7	11.3	-9°34.0	-11.7	57.9
1	193°38.4	22°09.7	85°37.0	11.3	-9°45.7	-11.7	57.9
2	208°38.3	22°09.3	100°07.2	11.3	-9°57.4	-11.6	57.9
3	223°38.2	22°09.0	114°37.5	11.3	-10°09.0	-11.6	57.8
4	238°38.1	22°08.7	129°07.8	11.3	-10°20.5	-11.5	57.8
5	253°38.0	22°08.4	143°38.0	11.2	-10°32.0	-11.4	57.8
6	268°37.9	22°08.0	158°08.3	11.2	-10°43.4	-11.4	57.8
7	283°37.8	22°07.7	172°38.5	11.2	-10°54.7	-11.3	57.7
8	298°37.8	22°07.4	187°08.7	11.2	-11°06.0	-11.2	57.7
9	313°37.7	22°07.0	201°38.9	11.2	-11°17.2	-11.2	57.7
10	328°37.6	22°06.7	216°09.1	11.2	-11°28.3	-11.1	57.7
11	343°37.5	22°06.4	230°39.2	11.1	-11°39.4	-11.0	57.6
12	358°37.4	22°06.0	245°09.4	11.1	-11°50.4	-11.0	57.6
13	13°37.3	22°05.7	259°39.5	11.1	-12°01.4	-10.9	57.6
14	28°37.3	22°05.4	274°09.6	11.1	-12°12.2	-10.8	57.6
15	43°37.2	22°05.0	288°39.7	11.1	-12°23.0	-10.8	57.5
16	58°37.1	22°04.7	303°09.7	11.0	-12°33.8	-10.7	57.5
17	73°37.0	22°04.4	317°39.8	11.0	-12°44.4	-10.6	57.5
18	88°36.9	22°04.0	332°09.8	11.0	-12°55.0	-10.5	57.5
19	103°36.9	22°03.7	346°39.8	11.0	-13°05.5	-10.5	57.5
20	118°36.8	22°03.4	1°09.8	11.0	-13°15.9	-10.4	57.4
21	133°36.7	22°03.0	15°39.7	10.9	-13°26.3	-10.3	57.4
22	148°36.6	22°02.7	30°09.6	10.9	-13°36.6	-10.2	57.4
23	163°36.5	22°02.4	44°39.5	10.9	-13°46.8	-10.2	57.4
	SD.=15.7	d=-0.3			S.D.=15.8		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:11	22:55	–:–	–:–
64	–:–	–:–	02:01	22:08	–:–	–:–
62	–:–	–:–	02:31	21:38	–:–	–:–
60	–:–	01:28	02:54	21:15	22:40	–:–
58	–:–	02:04	03:12	20:57	22:05	–:–
56	–:–	02:29	03:28	20:42	21:40	–:–
54	01:21	02:49	03:41	20:29	21:21	22:48
52	01:54	03:05	03:52	20:18	21:05	22:15
50	02:18	03:19	04:02	20:08	20:51	21:52
45	02:59	03:47	04:23	19:47	20:24	21:11
40	03:27	04:08	04:40	19:30	20:03	20:43
35	03:49	04:25	04:54	19:16	19:46	20:22
30	04:06	04:39	05:06	19:04	19:31	20:04
20	04:34	05:03	05:27	18:43	19:08	19:37
10	04:55	05:22	05:45	18:26	18:48	19:15
0	05:13	05:39	06:02	18:09	18:31	18:57
-10	05:29	05:56	06:18	17:53	18:15	18:41
-20	05:45	06:12	06:36	17:35	17:59	18:26
-30	06:00	06:30	06:56	17:15	17:41	18:11
-35	06:08	06:40	07:07	17:04	17:31	18:03
-40	06:17	06:51	07:21	16:50	17:20	17:54
-45	06:26	07:03	07:36	16:35	17:08	17:45
-50	06:37	07:18	07:56	16:15	16:53	17:34
-52	06:42	07:25	08:05	16:06	16:46	17:29
-54	06:47	07:32	08:15	15:56	16:39	17:24
-56	06:53	07:41	08:27	15:44	16:30	17:18
-58	06:59	07:50	08:40	15:31	16:21	17:12
-60	07:06	08:01	08:56	15:15	16:10	17:06

Lat.	**Moonrise**			**Moonset**		
	Tue	Wed	Thu	Tue	Wed	Thu
72	12:34	14:37	16:47	23:29	23:09	22:43
70	12:31	14:25	16:22	23:35	23:24	23:10
68	12:28	14:15	16:03	23:41	23:35	23:30
66	12:26	14:07	15:48	23:45	23:45	23:46
64	12:24	14:00	15:36	23:49	23:53	23:60
62	12:22	13:55	15:26	23:52	–:–	00:00
60	12:21	13:50	15:17	23:55	–:–	00:07
58	12:20	13:45	15:09	23:57	–:–	00:12
56	12:18	13:41	15:02	23:60	–:–	00:17
54	12:17	13:38	14:56	–:–	00:02	00:21
52	12:17	13:35	14:51	–:–	00:04	00:25
50	12:16	13:32	14:46	–:–	00:05	00:29
45	12:14	13:25	14:36	–:–	00:09	00:37
40	12:13	13:20	14:27	–:–	00:12	00:43
35	12:11	13:16	14:20	–:–	00:15	00:49
30	12:10	13:12	14:13	–:–	00:17	00:54
20	12:08	13:05	14:02	–:–	00:21	01:03
10	12:07	12:60	13:52	–:–	00:25	01:10
0	12:05	12:54	13:43	–:–	00:29	01:18
-10	12:04	12:49	13:34	–:–	00:32	01:25
-20	12:02	12:43	13:25	–:–	00:36	01:33
-30	12:00	12:37	13:14	–:–	00:40	01:41
-35	11:59	12:33	13:08	–:–	00:42	01:47
-40	11:58	12:29	13:01	–:–	00:45	01:52
-45	11:57	12:24	12:53	–:–	00:48	01:59
-50	11:56	12:19	12:43	–:–	00:52	02:07
-52	11:55	12:16	12:39	–:–	00:54	02:11
-54	11:54	12:13	12:34	–:–	00:56	02:15
-56	11:53	12:10	12:28	–:–	00:58	02:20
-58	11:53	12:07	12:22	–:–	01:00	02:25
-60	11:52	12:03	12:15	–:–	01:03	02:31

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	05:09	05:13	12:05	18:16	05:52	7(51%)
10	05:18	05:22	12:05	19:05	06:41	8(62%)
11	05:26	05:30	12:05	19:55	07:30	9(72%)

July 12, 13 ,14 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	289°36.0	188°26.1	23°18.0	160°31.9	19°48.9	34°51.0	-22°11.5	1°09.8	-22°02.2
1	304°38.5	203°25.2	23°17.8	175°32.7	19°48.5	49°53.7	-22°11.5	16°12.5	-22°02.2
2	319°41.0	218°24.3	23°17.7	190°33.6	19°48.1	64°56.4	-22°11.5	31°15.1	-22°02.3
3	334°43.4	233°23.5	23°17.5	205°34.4	19°47.7	79°59.1	-22°11.5	46°17.8	-22°02.3
4	349°45.9	248°22.6	23°17.4	220°35.2	19°47.3	95°01.8	-22°11.5	61°20.4	-22°02.3
5	4°48.4	263°21.7	23°17.2	235°36.1	19°46.9	110°04.5	-22°11.5	76°23.1	-22°02.3
6	19°50.8	278°20.9	23°17.1	250°36.9	19°46.5	125°07.2	-22°11.4	91°25.8	-22°02.4
7	34°53.3	293°20.0	23°17.0	265°37.7	19°46.1	140°09.9	-22°11.4	106°28.4	-22°02.4
8	49°55.8	308°19.1	23°16.8	280°38.5	19°45.7	155°12.6	-22°11.4	121°31.1	-22°02.4
9	64°58.2	323°18.2	23°16.7	295°39.4	19°45.3	170°15.3	-22°11.4	136°33.8	-22°02.5
10	80°00.7	338°17.4	23°16.5	310°40.2	19°44.9	185°18.0	-22°11.4	151°36.4	-22°02.5
11	95°03.2	353°16.5	23°16.4	325°41.0	19°44.5	200°20.7	-22°11.4	166°39.1	-22°02.5
12	110°05.6	8°15.6	23°16.2	340°41.9	19°44.1	215°23.4	-22°11.4	181°41.7	-22°02.5
13	125°08.1	23°14.8	23°16.1	355°42.7	19°43.7	230°26.1	-22°11.3	196°44.4	-22°02.6
14	140°10.5	38°13.9	23°15.9	10°43.5	19°43.3	245°28.8	-22°11.3	211°47.1	-22°02.6
15	155°13.0	53°13.0	23°15.8	25°44.4	19°42.9	260°31.5	-22°11.3	226°49.7	-22°02.6
16	170°15.5	68°12.1	23°15.6	40°45.2	19°42.5	275°34.2	-22°11.3	241°52.4	-22°02.6
17	185°17.9	83°11.3	23°15.4	55°46.0	19°42.1	290°36.9	-22°11.3	256°55.0	-22°02.7
18	200°20.4	98°10.4	23°15.3	70°46.9	19°41.7	305°39.6	-22°11.3	271°57.7	-22°02.7
19	215°22.9	113°09.5	23°15.1	85°47.7	19°41.3	320°42.3	-22°11.2	287°00.4	-22°02.7
20	230°25.3	128°08.7	23°15.0	100°48.5	19°40.9	335°44.9	-22°11.2	302°03.0	-22°02.7
21	245°27.8	143°07.8	23°14.8	115°49.4	19°40.5	350°47.6	-22°11.2	317°05.7	-22°02.8
22	260°30.3	158°06.9	23°14.6	130°50.2	19°40.1	5°50.3	-22°11.2	332°08.3	-22°02.8
23	275°32.7	173°06.1	23°14.5	145°51.0	19°39.7	20°53.0	-22°11.2	347°11.0	-22°02.8
Mer.pass.:4:40:		v-0.9 d-0.1 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	290°35.2	188°05.2	23°14.3	160°51.9	19°39.3	35°55.7	-22°11.2	2°13.7	-22°02.9
1	305°37.7	203°04.3	23°14.1	175°52.7	19°38.9	50°58.4	-22°11.2	17°16.3	-22°02.9
2	320°40.1	218°03.4	23°14.0	190°53.6	19°38.4	66°01.1	-22°11.1	32°19.0	-22°02.9
3	335°42.6	233°02.6	23°13.8	205°54.4	19°38.0	81°03.8	-22°11.1	47°21.6	-22°02.9
4	350°45.0	248°01.7	23°13.6	220°55.2	19°37.6	96°06.5	-22°11.1	62°24.3	-22°03.0
5	5°47.5	263°00.8	23°13.5	235°56.1	19°37.2	111°09.2	-22°11.1	77°27.0	-22°03.0
6	20°50.0	277°60.0	23°13.3	250°56.9	19°36.8	126°11.9	-22°11.1	92°29.6	-22°03.0
7	35°52.4	292°59.1	23°13.1	265°57.7	19°36.4	141°14.6	-22°11.1	107°32.3	-22°03.0
8	50°54.9	307°58.2	23°12.9	280°58.6	19°36.0	156°17.3	-22°11.1	122°34.9	-22°03.1
9	65°57.4	322°57.4	23°12.8	295°59.4	19°35.6	171°20.0	-22°11.0	137°37.6	-22°03.1
10	80°59.8	337°56.5	23°12.6	311°00.2	19°35.2	186°22.7	-22°11.0	152°40.3	-22°03.1
11	96°02.3	352°55.6	23°12.4	326°01.1	19°34.8	201°25.3	-22°11.0	167°42.9	-22°03.1
12	111°04.8	7°54.8	23°12.2	341°01.9	19°34.4	216°28.0	-22°11.0	182°45.6	-22°03.2
13	126°07.2	22°53.9	23°12.0	356°02.7	19°34.0	231°30.7	-22°11.0	197°48.2	-22°03.2
14	141°09.7	37°53.0	23°11.9	11°03.6	19°33.6	246°33.4	-22°11.0	212°50.9	-22°03.2
15	156°12.1	52°52.2	23°11.7	26°04.4	19°33.2	261°36.1	-22°11.0	227°53.6	-22°03.3
16	171°14.6	67°51.3	23°11.5	41°05.3	19°32.7	276°38.8	-22°10.9	242°56.2	-22°03.3
17	186°17.1	82°50.4	23°11.3	56°06.1	19°32.3	291°41.5	-22°10.9	257°58.9	-22°03.3
18	201°19.5	97°49.6	23°11.1	71°06.9	19°31.9	306°44.2	-22°10.9	273°01.5	-22°03.3
19	216°22.0	112°48.7	23°10.9	86°07.8	19°31.5	321°46.9	-22°10.9	288°04.2	-22°03.4
20	231°24.5	127°47.8	23°10.7	101°08.6	19°31.1	336°49.6	-22°10.9	303°06.9	-22°03.4
21	246°26.9	142°47.0	23°10.5	116°09.4	19°30.7	351°52.2	-22°10.9	318°09.5	-22°03.4
22	261°29.4	157°46.1	23°10.4	131°10.3	19°30.3	6°54.9	-22°10.9	333°12.2	-22°03.4
23	276°31.9	172°45.2	23°10.2	146°11.1	19°29.9	21°57.6	-22°10.8	348°14.8	-22°03.5
Mer.pass.:4:36:		v-0.9 d-0.2 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	291°34.3	187°44.4	23°10.0	161°12.0	19°29.5	37°00.3	-22°10.8	3°17.5	-22°03.5
1	306°36.8	202°43.5	23°09.8	176°12.8	19°29.1	52°03.0	-22°10.8	18°20.2	-22°03.5
2	321°39.3	217°42.6	23°09.6	191°13.6	19°28.6	67°05.7	-22°10.8	33°22.8	-22°03.5
3	336°41.7	232°41.8	23°09.4	206°14.5	19°28.2	82°08.4	-22°10.8	48°25.5	-22°03.6
4	351°44.2	247°40.9	23°09.2	221°15.3	19°27.8	97°11.1	-22°10.8	63°28.1	-22°03.6
5	6°46.6	262°40.0	23°09.0	236°16.1	19°27.4	112°13.7	-22°10.8	78°30.8	-22°03.6
6	21°49.1	277°39.2	23°08.8	251°17.0	19°27.0	127°16.4	-22°10.7	93°33.5	-22°03.7
7	36°51.6	292°38.3	23°08.6	266°17.8	19°26.6	142°19.1	-22°10.7	108°36.1	-22°03.7
8	51°54.0	307°37.4	23°08.4	281°18.7	19°26.2	157°21.8	-22°10.7	123°38.8	-22°03.7
9	66°56.5	322°36.6	23°08.2	296°19.5	19°25.8	172°24.5	-22°10.7	138°41.4	-22°03.7
10	81°59.0	337°35.7	23°08.0	311°20.3	19°25.4	187°27.2	-22°10.7	153°44.1	-22°03.8
11	97°01.4	352°34.8	23°07.8	326°21.2	19°24.9	202°29.8	-22°10.7	168°46.8	-22°03.8
12	112°03.9	7°34.0	23°07.5	341°22.0	19°24.5	217°32.5	-22°10.7	183°49.4	-22°03.8
13	127°06.4	22°33.1	23°07.3	356°22.9	19°24.1	232°35.2	-22°10.6	198°52.1	-22°03.8
14	142°08.8	37°32.2	23°07.1	11°23.7	19°23.7	247°37.9	-22°10.6	213°54.7	-22°03.9
15	157°11.3	52°31.4	23°06.9	26°24.5	19°23.3	262°40.6	-22°10.6	228°57.4	-22°03.9
16	172°13.8	67°30.5	23°06.7	41°25.4	19°22.9	277°43.3	-22°10.6	244°00.1	-22°03.9
17	187°16.2	82°29.6	23°06.5	56°26.2	19°22.5	292°46.0	-22°10.6	259°02.7	-22°03.9
18	202°18.7	97°28.8	23°06.3	71°27.1	19°22.0	307°48.6	-22°10.6	274°05.4	-22°04.0
19	217°21.1	112°27.9	23°06.0	86°27.9	19°21.6	322°51.3	-22°10.6	289°08.0	-22°04.0
20	232°23.6	127°27.1	23°05.8	101°28.7	19°21.2	337°54.0	-22°10.5	304°10.7	-22°04.0
21	247°26.1	142°26.2	23°05.6	116°29.6	19°20.8	352°56.7	-22°10.5	319°13.4	-22°04.0
22	262°28.5	157°25.3	23°05.4	131°30.4	19°20.4	7°59.4	-22°10.5	334°16.0	-22°04.1
23	277°31.0	172°24.5	23°05.2	146°31.3	19°20.0	23°02.0	-22°10.5	349°18.7	-22°04.1
Mer.pass.:4:32:		v-0.9 d-0.2 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Stars	SHA	Dec
Alpheratz	357°39.1	29°11.7
Ankaa	353°11.5	-42°11.8
Schedar	349°35.7	56°38.3
Diphda	348°51.6	-17°52.7
Achernar	335°23.7	-57°08.1
Hamal	327°56.2	23°33.1
Polaris	316°09.6	89°20.4
Akamar	315°15.4	-40°13.5
Menkar	314°10.9	4°09.8
Mirfak	308°34.7	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.4	-8°10.8
Capella	280°28.7	46°00.9
Bellatrix	278°27.9	6°21.9
Elnath	278°07.7	28°37.3
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.9	-52°42.4
Sirius	258°30.3	-16°44.4
Adara	255°09.6	-28°60.0
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.4
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.7	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°47.0	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°39.0
Acrux	173°04.8	-63°12.6
Gacrux	171°56.4	-57°13.5
Alioth	166°17.1	55°51.7
Spica	158°26.9	-11°15.7
Alcaid	152°55.5	49°13.4
Hadar	148°41.8	-60°28.1
Menkent	148°02.6	-36°27.9
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.8	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.6	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.4
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.2
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.1	-56°40.1
Deneb	49°28.2	45°21.0
Enif	33°42.8	9°57.9
Alnair	27°38.2	-46°51.8
Fomalhaut	15°19.2	-29°31.0
Scheat	13°49.2	28°11.1
Markab	13°34.0	15°18.5

2019/7/1	SHA	Mer.pass
Venus	258°50.0	11:27
Mars	230°55.8	13:17
Jupiter	105°14.9	21:37
Saturn	71°33.8	23:51

2019/7/1	SHA	Mer.pass
Venus	257°30.0	11:28
Mars	230°16.7	13:16
Jupiter	105°20.5	21:32
Saturn	71°38.5	23:47

2019/7/1	SHA	Mer.pass
Venus	256°10.0	11:30
Mars	229°37.6	13:14
Jupiter	105°26.0	21:28
Saturn	71°43.2	23:43

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°36.4	22°02.0	59°09.4	10.9	-13°56.9	-10.1	57.3
1	193°36.4	22°01.7	73°39.3	10.9	-14°06.9	-10.0	57.3
2	208°36.3	22°01.3	88°09.1	10.8	-14°16.9	-9.9	57.3
3	223°36.2	22°01.0	102°39.0	10.8	-14°26.7	-9.8	57.3
4	238°36.1	22°00.7	117°08.7	10.8	-14°36.5	-9.8	57.2
5	253°36.0	22°00.3	131°38.5	10.8	-14°46.3	-9.7	57.2
6	268°36.0	21°60.0	146°08.3	10.7	-14°55.9	-9.6	57.2
7	283°35.9	21°59.6	160°38.0	10.7	-15°05.4	-9.5	57.2
8	298°35.8	21°59.3	175°07.7	10.7	-15°14.9	-9.4	57.1
9	313°35.7	21°58.9	189°37.3	10.7	-15°24.2	-9.3	57.1
10	328°35.6	21°58.6	204°07.0	10.6	-15°33.5	-9.2	57.1
11	343°35.6	21°58.2	218°36.6	10.6	-15°42.7	-9.2	57.1
12	358°35.5	21°57.9	233°06.2	10.6	-15°51.8	-9.1	57.1
13	13°35.4	21°57.5	247°35.8	10.6	-16°00.9	-9.0	57.0
14	28°35.3	21°57.2	262°05.3	10.5	-16°09.8	-8.9	57.0
15	43°35.3	21°56.9	276°34.8	10.5	-16°18.6	-8.8	57.0
16	58°35.2	21°56.5	291°04.3	10.5	-16°27.4	-8.7	57.0
17	73°35.1	21°56.2	305°33.8	10.5	-16°36.0	-8.6	56.9
18	88°35.0	21°55.8	320°03.2	10.4	-16°44.6	-8.5	56.9
19	103°34.9	21°55.4	334°32.6	10.4	-16°53.0	-8.4	56.9
20	118°34.9	21°55.1	349°02.0	10.4	-17°01.4	-8.3	56.9
21	133°34.8	21°54.7	3°31.4	10.4	-17°09.7	-8.2	56.9
22	148°34.7	21°54.4	18°00.7	10.3	-17°17.9	-8.1	56.8
23	163°34.6	21°54.0	32°30.0	10.3	-17°26.0	-8.0	56.8
	SD.=15.7	d=-0.3			S.D.=15.6		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°34.6	21°53.7	46°59.3	10.3	-17°33.9	-7.9	56.8
1	193°34.5	21°53.3	61°28.6	10.3	-17°41.8	-7.8	56.8
2	208°34.4	21°53.0	75°57.8	10.2	-17°49.6	-7.7	56.7
3	223°34.3	21°52.6	90°27.0	10.2	-17°57.3	-7.6	56.7
4	238°34.3	21°52.3	104°56.2	10.2	-18°04.9	-7.5	56.7
5	253°34.2	21°51.9	119°25.4	10.2	-18°12.4	-7.4	56.7
6	268°34.1	21°51.5	133°54.5	10.1	-18°19.8	-7.3	56.7
7	283°34.0	21°51.2	148°23.7	10.1	-18°27.1	-7.2	56.6
8	298°34.0	21°50.8	162°52.7	10.1	-18°34.3	-7.1	56.6
9	313°33.9	21°50.5	177°21.8	10.1	-18°41.4	-7.0	56.6
10	328°33.8	21°50.1	191°50.9	10.0	-18°48.3	-6.9	56.6
11	343°33.7	21°49.7	206°19.9	10.0	-18°55.2	-6.8	56.5
12	358°33.7	21°49.4	220°48.9	10.0	-19°02.0	-6.7	56.5
13	13°33.6	21°49.0	235°17.9	10.0	-19°08.7	-6.6	56.5
14	28°33.5	21°48.6	249°46.8	9.9	-19°15.2	-6.5	56.5
15	43°33.5	21°48.3	264°15.8	9.9	-19°21.7	-6.4	56.5
16	58°33.4	21°47.9	278°44.7	9.9	-19°28.0	-6.3	56.4
17	73°33.3	21°47.5	293°13.6	9.9	-19°34.3	-6.2	56.4
18	88°33.2	21°47.2	307°42.5	9.9	-19°40.4	-6.1	56.4
19	103°33.2	21°46.8	322°11.3	9.8	-19°46.4	-6.0	56.4
20	118°33.1	21°46.4	336°40.1	9.8	-19°52.3	-5.9	56.4
21	133°33.0	21°46.1	351°09.0	9.8	-19°58.1	-5.8	56.3
22	148°33.0	21°45.7	5°37.8	9.8	-20°03.8	-5.6	56.3
23	163°32.9	21°45.3	20°06.5	9.8	-20°09.4	-5.5	56.3
	SD.=15.7	d=-0.4			S.D.=15.5		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°32.8	21°45.0	34°35.3	9.8	-20°14.9	-5.4	56.3
1	193°32.7	21°44.6	49°04.1	9.7	-20°20.3	-5.3	56.2
2	208°32.7	21°44.2	63°32.8	9.7	-20°25.5	-5.2	56.2
3	223°32.6	21°43.8	78°01.5	9.7	-20°30.7	-5.1	56.2
4	238°32.5	21°43.5	92°30.2	9.7	-20°35.7	-5.0	56.2
5	253°32.5	21°43.1	106°58.9	9.7	-20°40.6	-4.9	56.2
6	268°32.4	21°42.7	121°27.6	9.7	-20°45.4	-4.7	56.1
7	283°32.3	21°42.4	135°56.2	9.7	-20°50.1	-4.6	56.1
8	298°32.3	21°42.0	150°24.9	9.6	-20°54.7	-4.5	56.1
9	313°32.2	21°41.6	164°53.5	9.6	-20°59.2	-4.4	56.1
10	328°32.1	21°41.2	179°22.1	9.6	-21°03.5	-4.3	56.1
11	343°32.0	21°40.8	193°50.8	9.6	-21°07.7	-4.2	56.0
12	358°32.0	21°40.5	208°19.4	9.6	-21°11.9	-4.1	56.0
13	13°31.9	21°40.1	222°48.0	9.6	-21°15.9	-3.9	56.0
14	28°31.8	21°39.7	237°16.6	9.6	-21°19.8	-3.8	56.0
15	43°31.8	21°39.3	251°45.1	9.6	-21°23.5	-3.7	56.0
16	58°31.7	21°38.9	266°13.7	9.6	-21°27.2	-3.6	55.9
17	73°31.6	21°38.6	280°42.3	9.6	-21°30.7	-3.5	55.9
18	88°31.6	21°38.2	295°10.9	9.6	-21°34.2	-3.4	55.9
19	103°31.5	21°37.8	309°39.4	9.6	-21°37.5	-3.3	55.9
20	118°31.4	21°37.4	324°08.0	9.6	-21°40.7	-3.1	55.9
21	133°31.4	21°37.0	338°36.5	9.6	-21°43.7	-3.0	55.8
22	148°31.3	21°36.6	353°05.1	9.6	-21°46.7	-2.9	55.8
23	163°31.2	21°36.3	7°33.6	9.6	-21°49.5	-2.8	55.8
	SD.=15.7	d=-0.4			S.D.=15.4		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:25	22:42	–:–	–:–
64	–:–	–:–	02:09	22:00	–:–	–:–
62	–:–	00:27	02:38	21:32	23:33	–:–
60	–:–	01:37	02:59	21:11	22:31	–:–
58	–:–	02:11	03:17	20:54	21:59	–:–
56	00:25	02:34	03:32	20:39	21:36	23:36
54	01:29	02:53	03:44	20:27	21:17	22:40
52	02:00	03:09	03:55	20:16	21:02	22:10
50	02:22	03:22	04:05	20:06	20:48	21:48
45	03:02	03:49	04:26	19:45	20:22	21:09
40	03:30	04:10	04:42	19:29	20:01	20:41
35	03:51	04:27	04:56	19:15	19:44	20:20
30	04:08	04:41	05:08	19:03	19:30	20:03
20	04:35	05:04	05:28	18:43	19:07	19:36
10	04:56	05:23	05:46	18:26	18:48	19:15
0	05:14	05:40	06:02	18:09	18:32	18:58
-10	05:30	05:56	06:18	17:53	18:16	18:42
-20	05:45	06:12	06:35	17:36	17:60	18:27
-30	05:60	06:29	06:55	17:17	17:43	18:12
-35	06:07	06:39	07:06	17:05	17:33	18:04
-40	06:16	06:49	07:19	16:52	17:22	17:56
-45	06:25	07:02	07:35	16:37	17:10	17:47
-50	06:36	07:16	07:54	16:18	16:56	17:36
-52	06:40	07:23	08:03	16:09	16:49	17:32
-54	06:45	07:30	08:13	15:59	16:42	17:27
-56	06:50	07:38	08:24	15:48	16:34	17:21
-58	06:56	07:47	08:37	15:35	16:25	17:16
-60	07:03	07:58	08:52	15:20	16:14	17:09

Lat.	Moonrise			Moonset		
	Fri	Sat	Sun	Fri	Sat	Sun
72	19:26	–:–	–:–	21:49	–:–	–:–
70	18:28	–:–	–:–	22:49	–:–	–:–
68	17:54	19:49	22:04	23:24	23:15	22:49
66	17:29	19:09	20:41	23:49	23:56	–:–
64	17:11	18:42	20:04	–:–	00:09	00:24
62	16:55	18:21	19:37	00:11	00:25	00:45
60	16:42	18:04	19:17	00:21	00:38	01:03
58	16:31	17:49	19:00	00:29	00:50	01:17
56	16:22	17:37	18:46	00:36	01:00	01:30
54	16:13	17:26	18:33	00:43	01:09	01:41
52	16:06	17:17	18:23	00:49	01:17	01:51
50	15:59	17:09	18:13	00:55	01:24	01:60
45	15:44	16:51	17:53	01:07	01:40	02:18
40	15:33	16:36	17:37	01:16	01:53	02:33
35	15:23	16:24	17:23	01:25	02:04	02:46
30	15:14	16:13	17:11	01:32	02:13	02:57
20	14:59	15:55	16:50	01:45	02:30	03:17
10	14:46	15:39	16:33	01:56	02:44	03:33
0	14:33	15:24	16:16	02:07	02:58	03:49
-10	14:21	15:10	15:60	02:18	03:11	04:05
-20	14:08	14:54	15:42	02:29	03:26	04:22
-30	13:54	14:36	15:22	02:42	03:42	04:41
-35	13:45	14:26	15:10	02:50	03:52	04:52
-40	13:35	14:14	14:57	02:59	04:03	05:05
-45	13:24	13:60	14:41	03:09	04:16	05:21
-50	13:11	13:43	14:21	03:21	04:33	05:40
-52	13:04	13:35	14:12	03:27	04:40	05:49
-54	12:57	13:26	14:02	03:33	04:48	05:59
-56	12:50	13:16	13:50	03:40	04:58	06:10
-58	12:41	13:05	13:37	03:48	05:09	06:23
-60	12:31	12:52	13:21	03:57	05:21	06:39

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	05:34	05:38	12:05	20:45	08:20	10(81%)
13	05:42	05:45	12:05	21:36	09:10	11(89%)
14	05:49	05:52	12:05	22:28	10:02	12(94%)

July 15, 16 ,17 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	292°33.5	187°23.6	23°04.9	161°32.1	19°19.5	38°04.7	-22°10.5	4°21.3	-22°04.1
1	307°35.9	202°22.7	23°04.7	176°32.9	19°19.1	53°07.4	-22°10.5	19°24.0	-22°04.2
2	322°38.4	217°21.9	23°04.5	191°33.8	19°18.7	68°10.1	-22°10.5	34°26.7	-22°04.2
3	337°40.9	232°21.0	23°04.3	206°34.6	19°18.3	83°12.8	-22°10.4	49°29.3	-22°04.2
4	352°43.3	247°20.2	23°04.0	221°35.5	19°17.9	98°15.4	-22°10.4	64°32.0	-22°04.2
5	7°45.8	262°19.3	23°03.8	236°36.3	19°17.5	113°18.1	-22°10.4	79°34.6	-22°04.3
6	22°48.3	277°18.4	23°03.6	251°37.2	19°17.0	128°20.8	-22°10.4	94°37.3	-22°04.3
7	37°50.7	292°17.6	23°03.4	266°38.0	19°16.6	143°23.5	-22°10.4	109°40.0	-22°04.3
8	52°53.2	307°16.7	23°03.1	281°38.8	19°16.2	158°26.2	-22°10.4	124°42.6	-22°04.3
9	67°55.6	322°15.8	23°02.9	296°39.7	19°15.8	173°28.8	-22°10.4	139°45.3	-22°04.4
10	82°58.1	337°15.0	23°02.7	311°40.5	19°15.4	188°31.5	-22°10.4	154°47.9	-22°04.4
11	98°00.6	352°14.1	23°02.4	326°41.4	19°15.0	203°34.2	-22°10.3	169°50.6	-22°04.4
12	113°03.0	7°13.3	23°02.2	341°42.2	19°14.5	218°36.9	-22°10.3	184°53.2	-22°04.4
13	128°05.5	22°12.4	23°01.9	356°43.1	19°14.1	233°39.5	-22°10.3	199°55.9	-22°04.5
14	143°08.0	37°11.5	23°01.7	11°43.9	19°13.7	248°42.2	-22°10.3	214°58.6	-22°04.5
15	158°10.4	52°10.7	23°01.5	26°44.7	19°13.3	263°44.9	-22°10.3	230°01.2	-22°04.5
16	173°12.9	67°09.8	23°01.2	41°45.6	19°12.9	278°47.6	-22°10.3	245°03.9	-22°04.6
17	188°15.4	82°09.0	23°01.0	56°46.4	19°12.4	293°50.3	-22°10.3	260°06.5	-22°04.6
18	203°17.8	97°08.1	23°00.7	71°47.3	19°12.0	308°52.9	-22°10.2	275°09.2	-22°04.6
19	218°20.3	112°07.2	23°00.5	86°48.1	19°11.6	323°55.6	-22°10.2	290°11.9	-22°04.6
20	233°22.8	127°06.4	23°00.2	101°49.0	19°11.2	338°58.3	-22°10.2	305°14.5	-22°04.7
21	248°25.2	142°05.5	22°60.0	116°49.8	19°10.8	354°01.0	-22°10.2	320°17.2	-22°04.7
22	263°27.7	157°04.7	22°59.7	131°50.7	19°10.3	9°03.6	-22°10.2	335°19.8	-22°04.7
23	278°30.1	172°03.8	22°59.5	146°51.5	19°09.9	24°06.3	-22°10.2	350°22.5	-22°04.7
Mer.pass.:4:29:		v-0.9 d-0.2 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	293°32.6	187°02.9	22°59.2	161°52.3	19°09.5	39°09.0	-22°10.2	5°25.2	-22°04.8
1	308°35.1	202°02.1	22°59.0	176°53.2	19°09.1	54°11.7	-22°10.2	20°27.8	-22°04.8
2	323°37.5	217°01.2	22°58.7	191°54.0	19°08.7	69°14.3	-22°10.1	35°30.5	-22°04.8
3	338°40.0	232°00.4	22°58.5	206°54.9	19°08.2	84°17.0	-22°10.1	50°33.1	-22°04.8
4	353°42.5	246°59.5	22°58.2	221°55.7	19°07.8	99°19.7	-22°10.1	65°35.8	-22°04.9
5	8°44.9	261°58.6	22°58.0	236°56.6	19°07.4	114°22.3	-22°10.1	80°38.5	-22°04.9
6	23°47.4	276°57.8	22°57.7	251°57.4	19°07.0	129°25.0	-22°10.1	95°41.1	-22°04.9
7	38°49.9	291°56.9	22°57.5	266°58.3	19°06.5	144°27.7	-22°10.1	110°43.8	-22°04.9
8	53°52.3	306°56.1	22°57.2	281°59.1	19°06.1	159°30.4	-22°10.1	125°46.4	-22°05.0
9	68°54.8	321°55.2	22°56.9	296°60.0	19°05.7	174°33.0	-22°10.1	140°49.1	-22°05.0
10	83°57.2	336°54.4	22°56.7	312°00.8	19°05.3	189°35.7	-22°10.0	155°51.7	-22°05.0
11	98°59.7	351°53.5	22°56.4	327°01.6	19°04.8	204°38.4	-22°10.0	170°54.4	-22°05.1
12	114°02.2	6°52.6	22°56.1	342°02.5	19°04.4	219°41.0	-22°10.0	185°57.1	-22°05.1
13	129°04.6	21°51.8	22°55.9	357°03.3	19°04.0	234°43.7	-22°10.0	200°59.7	-22°05.1
14	144°07.1	36°50.9	22°55.6	12°04.2	19°03.6	249°46.4	-22°10.0	216°02.4	-22°05.1
15	159°09.6	51°50.1	22°55.3	27°05.0	19°03.1	264°49.1	-22°10.0	231°05.0	-22°05.2
16	174°12.0	66°49.2	22°55.1	42°05.9	19°02.7	279°51.7	-22°10.0	246°07.7	-22°05.2
17	189°14.5	81°48.4	22°54.8	57°06.7	19°02.3	294°54.4	-22°10.0	261°10.4	-22°05.2
18	204°17.0	96°47.5	22°54.5	72°07.6	19°01.9	309°57.1	-22°09.9	276°13.0	-22°05.2
19	219°19.4	111°46.6	22°54.2	87°08.4	19°01.4	324°59.7	-22°09.9	291°15.7	-22°05.3
20	234°21.9	126°45.8	22°54.0	102°09.3	19°01.0	340°02.4	-22°09.9	306°18.3	-22°05.3
21	249°24.4	141°44.9	22°53.7	117°10.1	19°00.6	355°05.1	-22°09.9	321°21.0	-22°05.3
22	264°26.8	156°44.1	22°53.4	132°11.0	19°00.2	10°07.7	-22°09.9	336°23.6	-22°05.3
23	279°29.3	171°43.2	22°53.1	147°11.8	18°59.7	25°10.4	-22°09.9	351°26.3	-22°05.4
Mer.pass.:4:25:		v-0.9 d-0.3 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	294°31.7	186°42.4	22°52.9	162°12.7	18°59.3	40°13.1	-22°09.9	6°29.0	-22°05.4
1	309°34.2	201°41.5	22°52.6	177°13.5	18°58.9	55°15.7	-22°09.9	21°31.6	-22°05.4
2	324°36.7	216°40.7	22°52.3	192°14.4	18°58.5	70°18.4	-22°09.8	36°34.3	-22°05.4
3	339°39.1	231°39.8	22°52.0	207°15.2	18°58.0	85°21.1	-22°09.8	51°36.9	-22°05.5
4	354°41.6	246°39.0	22°51.7	222°16.1	18°57.6	100°23.7	-22°09.8	66°39.6	-22°05.5
5	9°44.1	261°38.1	22°51.4	237°16.9	18°57.2	115°26.4	-22°09.8	81°42.3	-22°05.5
6	24°46.5	276°37.3	22°51.2	252°17.8	18°56.7	130°29.1	-22°09.8	96°44.9	-22°05.5
7	39°49.0	291°36.4	22°50.9	267°18.6	18°56.3	145°31.7	-22°09.8	111°47.6	-22°05.6
8	54°51.5	306°35.5	22°50.6	282°19.5	18°55.9	160°34.4	-22°09.8	126°50.2	-22°05.6
9	69°53.9	321°34.7	22°50.3	297°20.3	18°55.5	175°37.1	-22°09.8	141°52.9	-22°05.6
10	84°56.4	336°33.8	22°50.0	312°21.2	18°55.0	190°39.7	-22°09.7	156°55.5	-22°05.7
11	99°58.9	351°33.0	22°49.7	327°22.0	18°54.6	205°42.4	-22°09.7	171°58.2	-22°05.7
12	115°01.3	6°32.1	22°49.4	342°22.9	18°54.2	220°45.1	-22°09.7	187°00.9	-22°05.7
13	130°03.8	21°31.3	22°49.1	357°23.7	18°53.7	235°47.7	-22°09.7	202°03.5	-22°05.7
14	145°06.2	36°30.4	22°48.8	12°24.6	18°53.3	250°50.4	-22°09.7	217°06.2	-22°05.8
15	160°08.7	51°29.6	22°48.5	27°25.4	18°52.9	265°53.0	-22°09.7	232°08.8	-22°05.8
16	175°11.2	66°28.7	22°48.2	42°26.3	18°52.5	280°55.7	-22°09.7	247°11.5	-22°05.8
17	190°13.6	81°27.9	22°47.9	57°27.1	18°52.0	295°58.4	-22°09.7	262°14.2	-22°05.8
18	205°16.1	96°27.0	22°47.6	72°28.0	18°51.6	311°01.0	-22°09.6	277°16.8	-22°05.9
19	220°18.6	111°26.2	22°47.3	87°28.8	18°51.2	326°03.7	-22°09.6	292°19.5	-22°05.9
20	235°21.0	126°25.3	22°47.0	102°29.7	18°50.7	341°06.4	-22°09.6	307°22.1	-22°05.9
21	250°23.5	141°24.5	22°46.7	117°30.5	18°50.3	356°09.0	-22°09.6	322°24.8	-22°05.9
22	265°26.0	156°23.6	22°46.4	132°31.4	18°49.9	11°11.7	-22°09.6	337°27.4	-22°06.0
23	280°28.4	171°22.8	22°46.1	147°32.2	18°49.4	26°14.3	-22°09.6	352°30.1	-22°06.0
Mer.pass.:4:21:		v-0.9 d-0.3 m-3.8		v0.8 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.1	29°11.7
Ankaa	353°11.4	-42°11.8
Schedar	349°35.7	56°38.3
Diphda	348°51.5	-17°52.7
Achernar	335°23.7	-57°08.1
Hamal	327°56.1	23°33.1
Polaris	316°08.0	89°20.4
Akamar	315°15.3	-40°13.5
Menkar	314°10.8	4°09.9
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.9	16°32.7
Rigel	281°08.3	-8°10.8
Capella	280°28.7	46°00.9
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.2
Alnilam	275°42.5	-1°11.5
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.8	-52°42.4
Sirius	258°30.3	-16°44.4
Adara	255°09.6	-28°60.0
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.4
Suhail	222°49.8	-43°30.8
Miaplacidus	221°39.7	-69°48.0
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°47.0	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°39.0
Acrux	173°04.9	-63°12.6
Gacrux	171°56.4	-57°13.5
Alioth	166°17.1	55°51.7
Spica	158°26.9	-11°15.6
Alcaid	152°55.5	49°13.4
Hadar	148°41.8	-60°28.1
Menkent	148°02.6	-36°27.9
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.8	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.7	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.7
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°06.9
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.4
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.7	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.1	-56°40.2
Deneb	49°28.2	45°21.0
Enif	33°42.8	9°57.9
Alnair	27°38.2	-46°51.8
Fomalhaut	15°19.2	-29°31.0
Scheat	13°49.2	28°11.2
Markab	13°34.0	15°18.5

2019/7/1	**SHA**	**Mer.pass**
Venus	254°50.1	11:31
Mars	228°58.6	13:13
Jupiter	105°31.3	21:24
Saturn	71°47.9	23:38

2019/7/1	**SHA**	**Mer.pass**
Venus	253°30.3	11:32
Mars	228°19.7	13:12
Jupiter	105°36.4	21:20
Saturn	71°52.5	23:34

2019/7/1	**SHA**	**Mer.pass**
Venus	252°10.6	11:34
Mars	227°40.9	13:10
Jupiter	105°41.3	21:15
Saturn	71°57.2	23:30

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°31.2	21°35.9	22°02.2	9.6	-21°52.3	-2.7	55.8
1	193°31.1	21°35.5	36°30.8	9.6	-21°54.9	-2.5	55.8
2	208°31.0	21°35.1	50°59.3	9.6	-21°57.4	-2.4	55.7
3	223°31.0	21°34.7	65°27.9	9.6	-21°59.7	-2.3	55.7
4	238°30.9	21°34.3	79°56.4	9.6	-22°02.0	-2.2	55.7
5	253°30.9	21°33.9	94°25.0	9.6	-22°04.1	-2.1	55.7
6	268°30.8	21°33.5	108°53.6	9.6	-22°06.1	-2.0	55.7
7	283°30.7	21°33.2	123°22.1	9.6	-22°08.0	-1.8	55.6
8	298°30.7	21°32.8	137°50.7	9.6	-22°09.8	-1.7	55.6
9	313°30.6	21°32.4	152°19.3	9.6	-22°11.5	-1.6	55.6
10	328°30.5	21°32.0	166°47.9	9.6	-22°13.0	-1.5	55.6
11	343°30.5	21°31.6	181°16.5	9.6	-22°14.5	-1.4	55.6
12	358°30.4	21°31.2	195°45.2	9.6	-22°15.8	-1.3	55.6
13	13°30.3	21°30.8	210°13.8	9.6	-22°17.0	-1.1	55.5
14	28°30.3	21°30.4	224°42.4	9.7	-22°18.1	-1.0	55.5
15	43°30.2	21°30.0	239°11.1	9.7	-22°19.0	-0.9	55.5
16	58°30.2	21°29.6	253°39.8	9.7	-22°19.9	-0.8	55.5
17	73°30.1	21°29.2	268°08.4	9.7	-22°20.6	-0.7	55.5
18	88°30.0	21°28.8	282°37.1	9.7	-22°21.2	-0.5	55.4
19	103°30.0	21°28.4	297°05.9	9.7	-22°21.7	-0.4	55.4
20	118°29.9	21°28.0	311°34.6	9.7	-22°22.1	-0.3	55.4
21	133°29.8	21°27.6	326°03.4	9.8	-22°22.3	-0.2	55.4
22	148°29.8	21°27.2	340°32.1	9.8	-22°22.5	-0.1	55.4
23	163°29.7	21°26.8	355°00.9	9.8	-22°22.5	0.0	55.3
	SD.=15.7	d=-0.4			S.D.=15.2		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°29.7	21°26.4	9°29.7	9.8	-22°22.4	0.1	55.3
1	193°29.6	21°26.0	23°58.6	9.8	-22°22.2	0.3	55.3
2	208°29.5	21°25.6	38°27.4	9.9	-22°21.9	0.4	55.3
3	223°29.5	21°25.2	52°56.3	9.9	-22°21.4	0.5	55.3
4	238°29.4	21°24.8	67°25.2	9.9	-22°20.9	0.6	55.3
5	253°29.4	21°24.4	81°54.1	9.9	-22°20.2	0.7	55.2
6	268°29.3	21°24.0	96°23.1	10.0	-22°19.4	0.8	55.2
7	283°29.3	21°23.6	110°52.1	10.0	-22°18.5	1.0	55.2
8	298°29.2	21°23.2	125°21.1	10.0	-22°17.5	1.1	55.2
9	313°29.1	21°22.8	139°50.1	10.1	-22°16.4	1.2	55.2
10	328°29.1	21°22.4	154°19.2	10.1	-22°15.2	1.3	55.2
11	343°29.0	21°22.0	168°48.3	10.1	-22°13.8	1.4	55.1
12	358°29.0	21°21.6	183°17.5	10.1	-22°12.3	1.5	55.1
13	13°28.9	21°21.2	197°46.6	10.2	-22°10.8	1.6	55.1
14	28°28.8	21°20.7	212°15.8	10.2	-22°09.1	1.7	55.1
15	43°28.8	21°20.3	226°45.0	10.2	-22°07.3	1.9	55.1
16	58°28.7	21°19.9	241°14.3	10.3	-22°05.4	2.0	55.1
17	73°28.7	21°19.5	255°43.6	10.3	-22°03.4	2.1	55.0
18	88°28.6	21°19.1	270°12.9	10.4	-22°01.2	2.2	55.0
19	103°28.6	21°18.7	284°42.3	10.4	-21°59.0	2.3	55.0
20	118°28.5	21°18.3	299°11.7	10.4	-21°56.6	2.4	55.0
21	133°28.5	21°17.9	313°41.2	10.5	-21°54.2	2.5	55.0
22	148°28.4	21°17.4	328°10.7	10.5	-21°51.6	2.6	55.0
23	163°28.3	21°17.0	342°40.2	10.5	-21°48.9	2.7	54.9
	SD.=15.7	d=-0.4			S.D.=15.1		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.3	21°16.6	357°09.8	10.6	-21°46.2	2.8	54.9
1	193°28.2	21°16.2	11°39.4	10.6	-21°43.3	2.9	54.9
2	208°28.2	21°15.8	26°09.0	10.7	-21°40.3	3.0	54.9
3	223°28.1	21°15.4	40°38.7	10.7	-21°37.2	3.2	54.9
4	238°28.1	21°14.9	55°08.4	10.8	-21°34.0	3.3	54.9
5	253°28.0	21°14.5	69°38.2	10.8	-21°30.7	3.4	54.9
6	268°28.0	21°14.1	84°08.0	10.8	-21°27.3	3.5	54.8
7	283°27.9	21°13.7	98°37.9	10.9	-21°23.8	3.6	54.8
8	298°27.9	21°13.3	113°07.8	10.9	-21°20.1	3.7	54.8
9	313°27.8	21°12.8	127°37.7	11.0	-21°16.4	3.8	54.8
10	328°27.7	21°12.4	142°07.7	11.0	-21°12.6	3.9	54.8
11	343°27.7	21°12.0	156°37.8	11.1	-21°08.7	4.0	54.8
12	358°27.6	21°11.6	171°07.9	11.1	-21°04.6	4.1	54.7
13	13°27.6	21°11.1	185°38.0	11.2	-21°00.5	4.2	54.7
14	28°27.5	21°10.7	200°08.2	11.2	-20°56.3	4.3	54.7
15	43°27.5	21°10.3	214°38.4	11.3	-20°52.0	4.4	54.7
16	58°27.4	21°09.9	229°08.7	11.3	-20°47.6	4.5	54.7
17	73°27.4	21°09.4	243°39.0	11.4	-20°43.0	4.6	54.7
18	88°27.3	21°09.0	258°09.4	11.4	-20°38.4	4.7	54.7
19	103°27.3	21°08.6	272°39.8	11.5	-20°33.7	4.8	54.7
20	118°27.2	21°08.2	287°10.3	11.5	-20°28.9	4.9	54.6
21	133°27.2	21°07.7	301°40.8	11.6	-20°24.0	4.9	54.6
22	148°27.1	21°07.3	316°11.4	11.6	-20°19.0	5.0	54.6
23	163°27.1	21°06.9	330°42.1	11.7	-20°13.9	5.1	54.6
	SD.=15.7	d=-0.4			S.D.=15.0		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	–:–	–:–	01:39	22:30	–:–	–:–
64	–:–	–:–	02:18	21:52	–:–	–:–
62	–:–	00:55	02:44	21:26	23:11	–:–
60	–:–	01:47	03:05	21:06	22:22	–:–
58	–:–	02:18	03:22	20:49	21:53	–:–
56	00:50	02:40	03:36	20:35	21:31	23:16
54	01:38	02:58	03:48	20:23	21:13	22:31
52	02:07	03:13	03:59	20:13	20:58	22:04
50	02:28	03:26	04:08	20:03	20:45	21:43
45	03:06	03:52	04:28	19:43	20:19	21:06
40	03:33	04:12	04:44	19:27	19:59	20:39
35	03:53	04:29	04:58	19:14	19:43	20:18
30	04:10	04:43	05:10	19:02	19:29	20:02
20	04:37	05:05	05:29	18:43	19:07	19:35
10	04:57	05:24	05:47	18:25	18:48	19:15
0	05:14	05:40	06:02	18:10	18:32	18:58
-10	05:30	05:56	06:18	17:54	18:16	18:42
-20	05:44	06:11	06:35	17:37	18:01	18:28
-30	05:59	06:28	06:54	17:18	17:44	18:14
-35	06:06	06:38	07:05	17:07	17:35	18:06
-40	06:15	06:48	07:18	16:54	17:24	17:58
-45	06:24	06:60	07:33	16:40	17:12	17:49
-50	06:34	07:14	07:51	16:21	16:58	17:39
-52	06:38	07:20	07:60	16:13	16:52	17:35
-54	06:43	07:28	08:09	16:03	16:45	17:30
-56	06:48	07:35	08:20	15:52	16:37	17:25
-58	06:54	07:44	08:33	15:40	16:28	17:19
-60	06:60	07:54	08:47	15:25	16:19	17:13

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	23:45	23:23	–:–	–:–	00:43
66	21:51	22:27	22:42	00:12	00:51	02:00
64	21:08	21:50	22:14	00:50	01:33	02:37
62	20:39	21:24	21:53	01:16	02:02	03:03
60	20:17	21:03	21:35	01:37	02:24	03:24
58	19:60	20:46	21:21	01:54	02:42	03:41
56	19:45	20:32	21:08	02:08	02:57	03:55
54	19:32	20:19	20:57	02:21	03:10	04:07
52	19:20	20:08	20:47	02:32	03:21	04:18
50	19:10	19:59	20:39	02:42	03:31	04:27
45	18:49	19:38	20:20	03:02	03:52	04:47
40	18:32	19:22	20:05	03:19	04:09	05:04
35	18:18	19:08	19:52	03:33	04:24	05:17
30	18:05	18:55	19:41	03:45	04:36	05:29
20	17:44	18:35	19:22	04:06	04:57	05:50
10	17:25	18:16	19:05	04:24	05:16	06:07
0	17:08	17:60	18:49	04:41	05:33	06:24
-10	16:51	17:43	18:34	04:58	05:50	06:40
-20	16:33	17:24	18:17	05:16	06:09	06:58
-30	16:11	17:04	17:58	05:37	06:30	07:18
-35	15:59	16:51	17:46	05:50	06:42	07:30
-40	15:45	16:37	17:33	06:04	06:56	07:43
-45	15:28	16:21	17:18	06:20	07:13	07:59
-50	15:07	16:00	16:59	06:41	07:34	08:18
-52	14:57	15:50	16:50	06:51	07:44	08:27
-54	14:46	15:39	16:40	07:02	07:55	08:38
-56	14:33	15:27	16:28	07:14	08:08	08:49
-58	14:19	15:12	16:15	07:29	08:22	09:03
-60	14:01	14:55	15:60	07:46	08:40	09:18

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	05:55	05:58	12:05	23:20	10:54	13(98%)
16	06:01	06:04	12:06	00:11	11:46	14(100%)
17	06:07	06:09	12:06	00:11	12:36	15(100%)

July 18, 19 ,20 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	295°30.9	186°21.9	22°45.8	162°33.1	18°49.0	41°17.0	-22°09.6	7°32.8	-22°06.0
1	310°33.4	201°21.1	22°45.5	177°33.9	18°48.6	56°19.7	-22°09.6	22°35.4	-22°06.0
2	325°35.8	216°20.2	22°45.2	192°34.8	18°48.1	71°22.3	-22°09.5	37°38.1	-22°06.1
3	340°38.3	231°19.4	22°44.9	207°35.6	18°47.7	86°25.0	-22°09.5	52°40.7	-22°06.1
4	355°40.7	246°18.5	22°44.6	222°36.5	18°47.3	101°27.6	-22°09.5	67°43.4	-22°06.1
5	10°43.2	261°17.7	22°44.3	237°37.3	18°46.8	116°30.3	-22°09.5	82°46.0	-22°06.1
6	25°45.7	276°16.8	22°43.9	252°38.2	18°46.4	131°33.0	-22°09.5	97°48.7	-22°06.2
7	40°48.1	291°16.0	22°43.6	267°39.0	18°46.0	146°35.6	-22°09.5	112°51.4	-22°06.2
8	55°50.6	306°15.1	22°43.3	282°39.9	18°45.5	161°38.3	-22°09.5	127°54.0	-22°06.2
9	70°53.1	321°14.3	22°43.0	297°40.7	18°45.1	176°40.9	-22°09.5	142°56.7	-22°06.3
10	85°55.5	336°13.4	22°42.7	312°41.6	18°44.7	191°43.6	-22°09.5	157°59.3	-22°06.3
11	100°58.0	351°12.6	22°42.4	327°42.4	18°44.2	206°46.2	-22°09.4	173°02.0	-22°06.3
12	116°00.5	6°11.7	22°42.0	342°43.3	18°43.8	221°48.9	-22°09.4	188°04.6	-22°06.3
13	131°02.9	21°10.9	22°41.7	357°44.1	18°43.4	236°51.6	-22°09.4	203°07.3	-22°06.4
14	146°05.4	36°10.1	22°41.4	12°45.0	18°42.9	251°54.2	-22°09.4	218°10.0	-22°06.4
15	161°07.8	51°09.2	22°41.1	27°45.9	18°42.5	266°56.9	-22°09.4	233°12.6	-22°06.4
16	176°10.3	66°08.4	22°40.7	42°46.7	18°42.1	281°59.5	-22°09.4	248°15.3	-22°06.4
17	191°12.8	81°07.5	22°40.4	57°47.6	18°41.6	297°02.2	-22°09.4	263°17.9	-22°06.5
18	206°15.2	96°06.7	22°40.1	72°48.4	18°41.2	312°04.8	-22°09.4	278°20.6	-22°06.5
19	221°17.7	111°05.8	22°39.7	87°49.3	18°40.8	327°07.5	-22°09.4	293°23.2	-22°06.5
20	236°20.2	126°05.0	22°39.4	102°50.1	18°40.3	342°10.1	-22°09.3	308°25.9	-22°06.5
21	251°22.6	141°04.1	22°39.1	117°51.0	18°39.9	357°12.8	-22°09.3	323°28.6	-22°06.6
22	266°25.1	156°03.3	22°38.8	132°51.8	18°39.4	12°15.4	-22°09.3	338°31.2	-22°06.6
23	281°27.6	171°02.4	22°38.4	147°52.7	18°39.0	27°18.1	-22°09.3	353°33.9	-22°06.6
Mer.pass.:4:17:		v-0.8 d-0.3 m-3.8		v0.9 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	296°30.0	186°01.6	22°38.1	162°53.5	18°38.6	42°20.8	-22°09.3	8°36.5	-22°06.6
1	311°32.5	201°00.8	22°37.7	177°54.4	18°38.1	57°23.4	-22°09.3	23°39.2	-22°06.7
2	326°35.0	215°59.9	22°37.4	192°55.3	18°37.7	72°26.1	-22°09.3	38°41.8	-22°06.7
3	341°37.4	230°59.1	22°37.1	207°56.1	18°37.3	87°28.7	-22°09.3	53°44.5	-22°06.7
4	356°39.9	245°58.2	22°36.7	222°57.0	18°36.8	102°31.4	-22°09.3	68°47.2	-22°06.7
5	11°42.3	260°57.4	22°36.4	237°57.8	18°36.4	117°34.0	-22°09.2	83°49.8	-22°06.8
6	26°44.8	275°56.5	22°36.0	252°58.7	18°35.9	132°36.7	-22°09.2	98°52.5	-22°06.8
7	41°47.3	290°55.7	22°35.7	267°59.5	18°35.5	147°39.3	-22°09.2	113°55.1	-22°06.8
8	56°49.7	305°54.9	22°35.4	283°00.4	18°35.1	162°42.0	-22°09.2	128°57.8	-22°06.8
9	71°52.2	320°54.0	22°35.0	298°01.2	18°34.6	177°44.6	-22°09.2	144°00.4	-22°06.9
10	86°54.7	335°53.2	22°34.7	313°02.1	18°34.2	192°47.3	-22°09.2	159°03.1	-22°06.9
11	101°57.1	350°52.3	22°34.3	328°03.0	18°33.7	207°49.9	-22°09.2	174°05.7	-22°06.9
12	116°59.6	5°51.5	22°34.0	343°03.8	18°33.3	222°52.6	-22°09.2	189°08.4	-22°07.0
13	132°02.1	20°50.7	22°33.6	358°04.7	18°32.9	237°55.2	-22°09.2	204°11.1	-22°07.0
14	147°04.5	35°49.8	22°33.3	13°05.5	18°32.4	252°57.9	-22°09.1	219°13.7	-22°07.0
15	162°07.0	50°49.0	22°32.9	28°06.4	18°32.0	268°00.5	-22°09.1	234°16.4	-22°07.0
16	177°09.5	65°48.1	22°32.6	43°07.2	18°31.5	283°03.2	-22°09.1	249°19.0	-22°07.1
17	192°11.9	80°47.3	22°32.2	58°08.1	18°31.1	298°05.8	-22°09.1	264°21.7	-22°07.1
18	207°14.4	95°46.4	22°31.9	73°09.0	18°30.7	313°08.5	-22°09.1	279°24.3	-22°07.1
19	222°16.8	110°45.6	22°31.5	88°09.8	18°30.2	328°11.1	-22°09.1	294°27.0	-22°07.1
20	237°19.3	125°44.8	22°31.1	103°10.7	18°29.8	343°13.8	-22°09.1	309°29.7	-22°07.2
21	252°21.8	140°43.9	22°30.8	118°11.5	18°29.3	358°16.4	-22°09.1	324°32.3	-22°07.2
22	267°24.2	155°43.1	22°30.4	133°12.4	18°28.9	13°19.0	-22°09.1	339°35.0	-22°07.2
23	282°26.7	170°42.3	22°30.1	148°13.2	18°28.5	28°21.7	-22°09.0	354°37.6	-22°07.2
Mer.pass.:4:13:		v-0.8 d-0.3 m-3.8		v0.9 d-0.4 m1.8		v2.7 d0.0 m-2.4		v2.7 d-0.0 m0.1	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	297°29.2	185°41.4	22°29.7	163°14.1	18°28.0	43°24.3	-22°09.0	9°40.3	-22°07.3
1	312°31.6	200°40.6	22°29.3	178°15.0	18°27.6	58°27.0	-22°09.0	24°42.9	-22°07.3
2	327°34.1	215°39.7	22°29.0	193°15.8	18°27.1	73°29.6	-22°09.0	39°45.6	-22°07.3
3	342°36.6	230°38.9	22°28.6	208°16.7	18°26.7	88°32.3	-22°09.0	54°48.2	-22°07.3
4	357°39.0	245°38.1	22°28.2	223°17.5	18°26.2	103°34.9	-22°09.0	69°50.9	-22°07.4
5	12°41.5	260°37.2	22°27.9	238°18.4	18°25.8	118°37.6	-22°09.0	84°53.6	-22°07.4
6	27°43.9	275°36.4	22°27.5	253°19.3	18°25.3	133°40.2	-22°09.0	99°56.2	-22°07.4
7	42°46.4	290°35.6	22°27.1	268°20.1	18°24.9	148°42.9	-22°09.0	114°58.9	-22°07.4
8	57°48.9	305°34.7	22°26.7	283°21.0	18°24.5	163°45.5	-22°09.0	130°01.5	-22°07.5
9	72°51.3	320°33.9	22°26.4	298°21.8	18°24.0	178°48.1	-22°08.9	145°04.2	-22°07.5
10	87°53.8	335°33.0	22°26.0	313°22.7	18°23.6	193°50.8	-22°08.9	160°06.8	-22°07.5
11	102°56.3	350°32.2	22°25.6	328°23.6	18°23.1	208°53.4	-22°08.9	175°09.5	-22°07.5
12	117°58.7	5°31.4	22°25.2	343°24.4	18°22.7	223°56.1	-22°08.9	190°12.1	-22°07.6
13	133°01.2	20°30.5	22°24.9	358°25.3	18°22.2	238°58.7	-22°08.9	205°14.8	-22°07.6
14	148°03.7	35°29.7	22°24.5	13°26.1	18°21.8	254°01.3	-22°08.9	220°17.5	-22°07.6
15	163°06.1	50°28.9	22°24.1	28°27.0	18°21.3	269°04.0	-22°08.9	235°20.1	-22°07.6
16	178°08.6	65°28.0	22°23.7	43°27.9	18°20.9	284°06.6	-22°08.9	250°22.8	-22°07.7
17	193°11.1	80°27.2	22°23.3	58°28.7	18°20.5	299°09.3	-22°08.9	265°25.4	-22°07.7
18	208°13.5	95°26.4	22°23.0	73°29.6	18°20.0	314°11.9	-22°08.9	280°28.1	-22°07.7
19	223°16.0	110°25.5	22°22.6	88°30.4	18°19.6	329°14.6	-22°08.8	295°30.7	-22°07.7
20	238°18.4	125°24.7	22°22.2	103°31.3	18°19.1	344°17.2	-22°08.8	310°33.4	-22°07.8
21	253°20.9	140°23.9	22°21.8	118°32.2	18°18.7	359°19.8	-22°08.8	325°36.0	-22°07.8
22	268°23.4	155°23.0	22°21.4	133°33.0	18°18.2	14°22.5	-22°08.8	340°38.7	-22°07.8
23	283°25.8	170°22.2	22°21.0	148°33.9	18°17.8	29°25.1	-22°08.8	355°41.4	-22°07.9
Mer.pass.:4:09:		v-0.8 d-0.4 m-3.8		v0.9 d-0.4 m1.8		v2.6 d0.0 m-2.3		v2.7 d-0.0 m0.1	

Stars

	SHA	Dec
Alpheratz	357°39.0	29°11.7
Ankaa	353°11.4	-42°11.8
Schedar	349°35.6	56°38.3
Diphda	348°51.5	-17°52.7
Achernar	335°23.7	-57°08.1
Hamal	327°56.1	23°33.1
Polaris	316°06.5	89°20.4
Akamar	315°15.3	-40°13.5
Menkar	314°10.8	4°09.9
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.8	16°32.8
Rigel	281°08.3	-8°10.8
Capella	280°28.7	46°00.9
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.4
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.8	-52°42.3
Sirius	258°30.3	-16°44.4
Adara	255°09.6	-28°59.9
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.4
Suhail	222°49.8	-43°30.7
Miaplacidus	221°39.8	-69°47.9
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°47.0	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°39.0
Acrux	173°04.9	-63°12.6
Gacrux	171°56.4	-57°13.5
Alioth	166°17.2	55°51.7
Spica	158°26.9	-11°15.6
Alcaid	152°55.6	49°13.4
Hadar	148°41.9	-60°28.1
Menkent	148°02.6	-36°28.0
Arcturus	145°51.7	19°05.4
Rigil Kent.	139°45.9	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.7	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.4
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.7	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.1	-56°40.2
Deneb	49°28.2	45°21.0
Enif	33°42.8	9°57.9
Alnair	27°38.1	-46°51.8
Fomalhaut	15°19.2	-29°31.0
Scheat	13°49.1	28°11.2
Markab	13°34.0	15°18.5

2019/7/1	SHA	Mer.pass
Venus	250°51.0	11:35
Mars	227°02.2	13:09
Jupiter	105°46.1	21:11
Saturn	72°01.9	23:26

2019/7/1	SHA	Mer.pass
Venus	249°31.6	11:37
Mars	226°23.5	13:08
Jupiter	105°50.7	21:07
Saturn	72°06.5	23:21

2019/7/2	SHA	Mer.pass
Venus	248°12.3	11:38
Mars	225°44.9	13:06
Jupiter	105°55.2	21:03
Saturn	72°11.1	23:17

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°27.0	21°06.4	345°12.7	11.7	-20°08.7	5.2	54.6
1	193°27.0	21°06.0	359°43.5	11.8	-20°03.5	5.3	54.6
2	208°26.9	21°05.6	14°14.3	11.8	-19°58.1	5.4	54.6
3	223°26.9	21°05.1	28°45.1	11.9	-19°52.6	5.5	54.5
4	238°26.8	21°04.7	43°16.0	11.9	-19°47.1	5.6	54.5
5	253°26.8	21°04.3	57°46.9	12.0	-19°41.4	5.7	54.5
6	268°26.7	21°03.8	72°17.9	12.0	-19°35.7	5.8	54.5
7	283°26.7	21°03.4	86°49.0	12.1	-19°29.9	5.9	54.5
8	298°26.6	21°03.0	101°20.1	12.1	-19°24.0	5.9	54.5
9	313°26.6	21°02.5	115°51.2	12.2	-19°18.0	6.0	54.5
10	328°26.6	21°02.1	130°22.4	12.2	-19°11.9	6.1	54.5
11	343°26.5	21°01.6	144°53.7	12.3	-19°05.8	6.2	54.5
12	358°26.5	21°01.2	159°25.0	12.3	-18°59.5	6.3	54.4
13	13°26.4	21°00.8	173°56.4	12.4	-18°53.2	6.4	54.4
14	28°26.4	21°00.3	188°27.8	12.4	-18°46.8	6.5	54.4
15	43°26.3	20°59.9	202°59.3	12.5	-18°40.3	6.5	54.4
16	58°26.3	20°59.4	217°30.8	12.6	-18°33.7	6.6	54.4
17	73°26.2	20°59.0	232°02.4	12.6	-18°27.1	6.7	54.4
18	88°26.2	20°58.6	246°34.0	12.7	-18°20.3	6.8	54.4
19	103°26.1	20°58.1	261°05.7	12.7	-18°13.5	6.9	54.4
20	118°26.1	20°57.7	275°37.5	12.8	-18°06.6	6.9	54.4
21	133°26.1	20°57.2	290°09.3	12.8	-17°59.7	7.0	54.3
22	148°26.0	20°56.8	304°41.1	12.9	-17°52.6	7.1	54.3
23	163°26.0	20°56.3	319°13.0	12.9	-17°45.5	7.2	54.3
	SD.=15.7	d=-0.4			S.D.=14.9		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°25.9	20°55.9	333°45.0	13.0	-17°38.3	7.2	54.3
1	193°25.9	20°55.5	348°17.0	13.0	-17°31.0	7.3	54.3
2	208°25.8	20°55.0	2°49.1	13.1	-17°23.7	7.4	54.3
3	223°25.8	20°54.6	17°21.2	13.1	-17°16.2	7.5	54.3
4	238°25.7	20°54.1	31°53.3	13.2	-17°08.7	7.5	54.3
5	253°25.7	20°53.7	46°25.6	13.2	-17°01.2	7.6	54.3
6	268°25.7	20°53.2	60°57.8	13.3	-16°53.5	7.7	54.3
7	283°25.6	20°52.8	75°30.2	13.4	-16°45.8	7.7	54.3
8	298°25.6	20°52.3	90°02.6	13.4	-16°38.0	7.8	54.2
9	313°25.5	20°51.9	104°35.0	13.5	-16°30.2	7.9	54.2
10	328°25.5	20°51.4	119°07.5	13.5	-16°22.2	8.0	54.2
11	343°25.5	20°51.0	133°40.0	13.6	-16°14.3	8.0	54.2
12	358°25.4	20°50.5	148°12.6	13.6	-16°06.2	8.1	54.2
13	13°25.4	20°50.0	162°45.2	13.7	-15°58.1	8.2	54.2
14	28°25.3	20°49.6	177°17.9	13.7	-15°49.9	8.2	54.2
15	43°25.3	20°49.1	191°50.7	13.8	-15°41.6	8.3	54.2
16	58°25.2	20°48.7	206°23.4	13.8	-15°33.3	8.3	54.2
17	73°25.2	20°48.2	220°56.3	13.9	-15°24.9	8.4	54.2
18	88°25.2	20°47.8	235°29.2	13.9	-15°16.5	8.5	54.2
19	103°25.1	20°47.3	250°02.1	14.0	-15°08.0	8.5	54.2
20	118°25.1	20°46.8	264°35.1	14.0	-14°59.4	8.6	54.2
21	133°25.1	20°46.4	279°08.1	14.1	-14°50.8	8.7	54.2
22	148°25.0	20°45.9	293°41.2	14.1	-14°42.1	8.7	54.1
23	163°25.0	20°45.5	308°14.3	14.2	-14°33.4	8.8	54.1
	SD.=15.7	d=-0.4			S.D.=14.8		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°24.9	20°45.0	322°47.5	14.2	-14°24.6	8.8	54.1
1	193°24.9	20°44.5	337°20.7	14.2	-14°15.7	8.9	54.1
2	208°24.9	20°44.1	351°54.0	14.3	-14°06.8	8.9	54.1
3	223°24.8	20°43.6	6°27.3	14.3	-13°57.8	9.0	54.1
4	238°24.8	20°43.2	21°00.7	14.4	-13°48.8	9.1	54.1
5	253°24.7	20°42.7	35°34.1	14.4	-13°39.7	9.1	54.1
6	268°24.7	20°42.2	50°07.5	14.5	-13°30.6	9.2	54.1
7	283°24.7	20°41.8	64°41.0	14.5	-13°21.4	9.2	54.1
8	298°24.6	20°41.3	79°14.5	14.6	-13°12.1	9.3	54.1
9	313°24.6	20°40.8	93°48.1	14.6	-13°02.8	9.3	54.1
10	328°24.6	20°40.4	108°21.7	14.6	-12°53.5	9.4	54.1
11	343°24.5	20°39.9	122°55.4	14.7	-12°44.1	9.4	54.1
12	358°24.5	20°39.4	137°29.1	14.7	-12°34.6	9.5	54.1
13	13°24.5	20°39.0	152°02.8	14.8	-12°25.1	9.5	54.1
14	28°24.4	20°38.5	166°36.6	14.8	-12°15.6	9.6	54.1
15	43°24.4	20°38.0	181°10.4	14.8	-12°06.0	9.6	54.1
16	58°24.4	20°37.6	195°44.3	14.9	-11°56.3	9.7	54.1
17	73°24.3	20°37.1	210°18.2	14.9	-11°46.6	9.7	54.1
18	88°24.3	20°36.6	224°52.1	15.0	-11°36.9	9.8	54.1
19	103°24.3	20°36.1	239°26.1	15.0	-11°27.1	9.8	54.1
20	118°24.2	20°35.7	254°00.1	15.0	-11°17.3	9.8	54.1
21	133°24.2	20°35.2	268°34.2	15.1	-11°07.4	9.9	54.1
22	148°24.2	20°34.7	283°08.3	15.1	-10°57.5	9.9	54.1
23	163°24.1	20°34.3	297°42.4	15.1	-10°47.5	10.0	54.1
	SD.=15.7	d=-0.5			S.D.=14.8		

	Twilight					Twilight
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	00:42	23:19	–:–	–:–
66	–:–	–:–	01:51	22:18	–:–	–:–
64	–:–	–:–	02:26	21:44	–:–	–:–
62	–:–	01:13	02:51	21:19	22:54	–:–
60	–:–	01:57	03:11	21:00	22:13	–:–
58	–:–	02:25	03:27	20:44	21:46	–:–
56	01:07	02:46	03:41	20:31	21:25	23:01
54	01:47	03:03	03:52	20:19	21:08	22:23
52	02:13	03:18	04:03	20:09	20:54	21:58
50	02:33	03:30	04:12	20:00	20:41	21:38
45	03:10	03:56	04:31	19:41	20:16	21:02
40	03:36	04:15	04:47	19:26	19:57	20:36
35	03:56	04:31	04:60	19:12	19:41	20:16
30	04:12	04:44	05:11	19:01	19:28	19:60
20	04:38	05:06	05:31	18:42	19:06	19:34
10	04:58	05:25	05:47	18:25	18:48	19:14
0	05:15	05:41	06:03	18:10	18:32	18:58
-10	05:30	05:56	06:18	17:55	18:17	18:43
-20	05:44	06:11	06:34	17:38	18:02	18:29
-30	05:58	06:27	06:53	17:20	17:46	18:15
-35	06:05	06:36	07:04	17:09	17:37	18:08
-40	06:13	06:46	07:16	16:57	17:27	17:60
-45	06:22	06:58	07:31	16:42	17:15	17:51
-50	06:31	07:11	07:48	16:25	17:02	17:42
-52	06:35	07:18	07:57	16:16	16:55	17:38
-54	06:40	07:25	08:06	16:07	16:49	17:33
-56	06:45	07:32	08:16	15:57	16:41	17:28
-58	06:50	07:40	08:28	15:45	16:33	17:23
-60	06:56	07:50	08:42	15:31	16:23	17:17

	Moonrise			Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	00:57	23:34	–:–	02:53	05:24
70	–:–	23:30	23:17	–:–	03:58	05:52
68	23:14	23:08	23:03	02:48	04:34	06:13
66	22:48	22:51	22:52	03:28	04:59	06:30
64	22:28	22:37	22:42	03:55	05:19	06:43
62	22:12	22:25	22:34	04:16	05:35	06:54
60	21:58	22:14	22:27	04:33	05:48	07:04
58	21:46	22:05	22:21	04:48	05:59	07:12
56	21:36	21:57	22:15	04:60	06:09	07:19
54	21:27	21:50	22:10	05:11	06:17	07:25
52	21:19	21:44	22:06	05:20	06:25	07:31
50	21:11	21:38	22:01	05:28	06:32	07:37
45	20:56	21:26	21:52	05:46	06:47	07:48
40	20:43	21:16	21:45	06:01	06:59	07:57
35	20:32	21:07	21:39	06:13	07:09	08:05
30	20:22	20:59	21:33	06:24	07:18	08:12
20	20:05	20:46	21:23	06:42	07:34	08:24
10	19:51	20:34	21:14	06:58	07:47	08:34
0	19:37	20:23	21:06	07:13	07:59	08:44
-10	19:23	20:12	20:58	07:27	08:12	08:54
-20	19:09	19:60	20:49	07:43	08:25	09:04
-30	18:52	19:46	20:39	08:01	08:40	09:15
-35	18:42	19:38	20:34	08:12	08:49	09:22
-40	18:31	19:29	20:27	08:23	08:59	09:30
-45	18:18	19:18	20:19	08:37	09:10	09:39
-50	18:01	19:05	20:10	08:54	09:24	09:49
-52	17:54	18:59	20:06	09:02	09:31	09:54
-54	17:45	18:53	20:01	09:11	09:38	09:59
-56	17:36	18:45	19:56	09:21	09:46	10:05
-58	17:25	18:37	19:50	09:33	09:55	10:12
-60	17:12	18:27	19:43	09:46	10:05	10:19

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	06:12	06:14	12:06	01:01	13:25	16(98%)
19	06:16	06:18	12:06	01:48	14:11	17(94%)
20	06:20	06:22	12:06	02:33	14:55	18(88%)

July 21, 22 ,23 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	298°28.3	185°21.4	22°20.6	163°34.7	18°17.3	44°27.7	-22°08.8	10°44.0	-22°07.9
1	313°30.8	200°20.5	22°20.2	178°35.6	18°16.9	59°30.4	-22°08.8	25°46.7	-22°07.9
2	328°33.2	215°19.7	22°19.9	193°36.5	18°16.4	74°33.0	-22°08.8	40°49.3	-22°07.9
3	343°35.7	230°18.9	22°19.5	208°37.3	18°16.0	89°35.7	-22°08.8	55°52.0	-22°08.0
4	358°38.2	245°18.1	22°19.1	223°38.2	18°15.5	104°38.3	-22°08.8	70°54.6	-22°08.0
5	13°40.6	260°17.2	22°18.7	238°39.1	18°15.1	119°40.9	-22°08.7	85°57.3	-22°08.0
6	28°43.1	275°16.4	22°18.3	253°39.9	18°14.6	134°43.6	-22°08.7	100°59.9	-22°08.0
7	43°45.6	290°15.6	22°17.9	268°40.8	18°14.2	149°46.2	-22°08.7	116°02.6	-22°08.1
8	58°48.0	305°14.7	22°17.5	283°41.6	18°13.7	164°48.8	-22°08.7	131°05.2	-22°08.1
9	73°50.5	320°13.9	22°17.1	298°42.5	18°13.3	179°51.5	-22°08.7	146°07.9	-22°08.1
10	88°52.9	335°13.1	22°16.7	313°43.4	18°12.8	194°54.1	-22°08.7	161°10.6	-22°08.1
11	103°55.4	350°12.2	22°16.3	328°44.2	18°12.4	209°56.8	-22°08.7	176°13.2	-22°08.2
12	118°57.9	5°11.4	22°15.9	343°45.1	18°11.9	224°59.4	-22°08.7	191°15.9	-22°08.2
13	134°00.3	20°10.6	22°15.5	358°46.0	18°11.5	240°02.0	-22°08.7	206°18.5	-22°08.2
14	149°02.8	35°09.8	22°15.1	13°46.8	18°11.0	255°04.7	-22°08.7	221°21.2	-22°08.2
15	164°05.3	50°08.9	22°14.6	28°47.7	18°10.6	270°07.3	-22°08.6	236°23.8	-22°08.3
16	179°07.7	65°08.1	22°14.2	43°48.6	18°10.1	285°09.9	-22°08.6	251°26.5	-22°08.3
17	194°10.2	80°07.3	22°13.8	58°49.4	18°09.7	300°12.6	-22°08.6	266°29.1	-22°08.3
18	209°12.7	95°06.5	22°13.4	73°50.3	18°09.2	315°15.2	-22°08.6	281°31.8	-22°08.3
19	224°15.1	110°05.6	22°13.0	88°51.1	18°08.8	330°17.8	-22°08.6	296°34.4	-22°08.4
20	239°17.6	125°04.8	22°12.6	103°52.0	18°08.3	345°20.5	-22°08.6	311°37.1	-22°08.4
21	254°20.0	140°04.0	22°12.2	118°52.9	18°07.9	0°23.1	-22°08.6	326°39.7	-22°08.4
22	269°22.5	155°03.2	22°11.8	133°53.7	18°07.4	15°25.7	-22°08.6	341°42.4	-22°08.4
23	284°25.0	170°02.3	22°11.3	148°54.6	18°07.0	30°28.4	-22°08.6	356°45.1	-22°08.5
Mer.pass.:4:05:		v-0.8 d-0.4 m-3.8		v0.9 d-0.4 m1.8		v2.6 d0.0 m-2.3		v2.7 d-0.0 m0.1	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	299°27.4	185°01.5	22°10.9	163°55.5	18°06.5	45°31.0	-22°08.6	11°47.7	-22°08.5
1	314°29.9	200°00.7	22°10.5	178°56.3	18°06.1	60°33.6	-22°08.6	26°50.4	-22°08.5
2	329°32.4	214°59.9	22°10.1	193°57.2	18°05.6	75°36.2	-22°08.5	41°53.0	-22°08.5
3	344°34.8	229°59.0	22°09.7	208°58.1	18°05.2	90°38.9	-22°08.5	56°55.7	-22°08.6
4	359°37.3	244°58.2	22°09.2	223°58.9	18°04.7	105°41.5	-22°08.5	71°58.3	-22°08.6
5	14°39.8	259°57.4	22°08.8	238°59.8	18°04.3	120°44.1	-22°08.5	87°01.0	-22°08.6
6	29°42.2	274°56.6	22°08.4	254°00.7	18°03.8	135°46.8	-22°08.5	102°03.6	-22°08.6
7	44°44.7	289°55.7	22°08.0	269°01.5	18°03.3	150°49.4	-22°08.5	117°06.3	-22°08.7
8	59°47.2	304°54.9	22°07.5	284°02.4	18°02.9	165°52.0	-22°08.5	132°08.9	-22°08.7
9	74°49.6	319°54.1	22°07.1	299°03.3	18°02.4	180°54.7	-22°08.5	147°11.6	-22°08.7
10	89°52.1	334°53.3	22°06.7	314°04.1	18°02.0	195°57.3	-22°08.5	162°14.2	-22°08.7
11	104°54.5	349°52.4	22°06.3	329°05.0	18°01.5	210°59.9	-22°08.5	177°16.9	-22°08.8
12	119°57.0	4°51.6	22°05.8	344°05.9	18°01.1	226°02.5	-22°08.5	192°19.5	-22°08.8
13	134°59.5	19°50.8	22°05.4	359°06.7	18°00.6	241°05.2	-22°08.4	207°22.2	-22°08.8
14	150°01.9	34°50.0	22°05.0	14°07.6	18°00.2	256°07.8	-22°08.4	222°24.9	-22°08.8
15	165°04.4	49°49.2	22°04.5	29°08.5	17°59.7	271°10.4	-22°08.4	237°27.5	-22°08.9
16	180°06.9	64°48.3	22°04.1	44°09.3	17°59.2	286°13.0	-22°08.4	252°30.2	-22°08.9
17	195°09.3	79°47.5	22°03.7	59°10.2	17°58.8	301°15.7	-22°08.4	267°32.8	-22°08.9
18	210°11.8	94°46.7	22°03.2	74°11.1	17°58.3	316°18.3	-22°08.4	282°35.5	-22°08.9
19	225°14.3	109°45.9	22°02.8	89°11.9	17°57.9	331°20.9	-22°08.4	297°38.1	-22°09.0
20	240°16.7	124°45.1	22°02.3	104°12.8	17°57.4	346°23.5	-22°08.4	312°40.8	-22°09.0
21	255°19.2	139°44.2	22°01.9	119°13.7	17°57.0	1°26.2	-22°08.4	327°43.4	-22°09.0
22	270°21.7	154°43.4	22°01.5	134°14.5	17°56.5	16°28.8	-22°08.4	342°46.1	-22°09.0
23	285°24.1	169°42.6	22°01.0	149°15.4	17°56.1	31°31.4	-22°08.4	357°48.7	-22°09.1
Mer.pass.:4:01:		v-0.8 d-0.4 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.7 d-0.0 m0.1	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	300°26.6	184°41.8	22°00.6	164°16.3	17°55.6	46°34.0	-22°08.4	12°51.4	-22°09.1
1	315°29.0	199°41.0	22°00.1	179°17.1	17°55.1	61°36.7	-22°08.3	27°54.0	-22°09.1
2	330°31.5	214°40.2	21°59.7	194°18.0	17°54.7	76°39.3	-22°08.3	42°56.7	-22°09.1
3	345°34.0	229°39.3	21°59.2	209°18.9	17°54.2	91°41.9	-22°08.3	57°59.3	-22°09.2
4	0°36.4	244°38.5	21°58.8	224°19.7	17°53.8	106°44.5	-22°08.3	73°02.0	-22°09.2
5	15°38.9	259°37.7	21°58.3	239°20.6	17°53.3	121°47.2	-22°08.3	88°04.6	-22°09.2
6	30°41.4	274°36.9	21°57.9	254°21.5	17°52.8	136°49.8	-22°08.3	103°07.3	-22°09.2
7	45°43.8	289°36.1	21°57.4	269°22.4	17°52.4	151°52.4	-22°08.3	118°09.9	-22°09.3
8	60°46.3	304°35.3	21°57.0	284°23.2	17°51.9	166°55.0	-22°08.3	133°12.6	-22°09.3
9	75°48.8	319°34.5	21°56.5	299°24.1	17°51.5	181°57.6	-22°08.3	148°15.3	-22°09.3
10	90°51.2	334°33.6	21°56.1	314°25.0	17°51.0	197°00.3	-22°08.3	163°17.9	-22°09.3
11	105°53.7	349°32.8	21°55.6	329°25.8	17°50.5	212°02.9	-22°08.3	178°20.6	-22°09.4
12	120°56.1	4°32.0	21°55.1	344°26.7	17°50.1	227°05.5	-22°08.3	193°23.2	-22°09.4
13	135°58.6	19°31.2	21°54.7	359°27.6	17°49.6	242°08.1	-22°08.2	208°25.9	-22°09.4
14	151°01.1	34°30.4	21°54.2	14°28.4	17°49.2	257°10.7	-22°08.2	223°28.5	-22°09.4
15	166°03.5	49°29.6	21°53.8	29°29.3	17°48.7	272°13.4	-22°08.2	238°31.2	-22°09.5
16	181°06.0	64°28.8	21°53.3	44°30.2	17°48.2	287°16.0	-22°08.2	253°33.8	-22°09.5
17	196°08.5	79°27.9	21°52.8	59°31.0	17°47.8	302°18.6	-22°08.2	268°36.5	-22°09.5
18	211°10.9	94°27.1	21°52.4	74°31.9	17°47.3	317°21.2	-22°08.2	283°39.1	-22°09.5
19	226°13.4	109°26.3	21°51.9	89°32.8	17°46.9	332°23.8	-22°08.2	298°41.8	-22°09.6
20	241°15.9	124°25.5	21°51.4	104°33.7	17°46.4	347°26.4	-22°08.2	313°44.4	-22°09.6
21	256°18.3	139°24.7	21°51.0	119°34.5	17°45.9	2°29.1	-22°08.2	328°47.1	-22°09.6
22	271°20.8	154°23.9	21°50.5	134°35.4	17°45.5	17°31.7	-22°08.2	343°49.7	-22°09.6
23	286°23.3	169°23.1	21°50.0	149°36.3	17°45.0	32°34.3	-22°08.2	358°52.4	-22°09.7
Mer.pass.:3:57:		v-0.8 d-0.4 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.7 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.0	29°11.7
Ankaa	353°11.4	-42°11.8
Schedar	349°35.6	56°38.3
Diphda	348°51.5	-17°52.7
Achernar	335°23.6	-57°08.1
Hamal	327°56.1	23°33.1
Polaris	316°05.1	89°20.4
Akamar	315°15.3	-40°13.5
Menkar	314°10.8	4°09.9
Mirfak	308°34.6	49°55.5
Aldebaran	290°44.8	16°32.8
Rigel	281°08.3	-8°10.8
Capella	280°28.7	46°00.9
Bellatrix	278°27.8	6°21.9
Elnath	278°07.7	28°37.3
Alnilam	275°42.4	-1°11.4
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.8	-52°42.3
Sirius	258°30.3	-16°44.4
Adara	255°09.6	-28°59.9
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.4
Suhail	222°49.8	-43°30.7
Miaplacidus	221°39.8	-69°47.9
Alphard	217°52.3	-8°44.6
Regulus	207°39.3	11°52.4
Dubhe	193°47.0	61°39.1
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°38.9
Acrux	173°04.9	-63°12.6
Gacrux	171°56.5	-57°13.5
Alioth	166°17.2	55°51.7
Spica	158°26.9	-11°15.6
Alcaid	152°55.6	49°13.4
Hadar	148°41.9	-60°28.1
Menkent	148°02.6	-36°27.9
Arcturus	145°51.7	19°05.5
Rigil Kent.	139°45.9	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.8	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.4
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.1	-56°40.2
Deneb	49°28.2	45°21.0
Enif	33°42.7	9°57.9
Alnair	27°38.1	-46°51.8
Fomalhaut	15°19.2	-29°31.0
Scheat	13°49.1	28°11.2
Markab	13°34.0	15°18.6

2019/7/2	**SHA**	**Mer.pass**
Venus	246°53.1	11:39
Mars	225°06.4	13:05
Jupiter	105°59.4	20:58
Saturn	72°15.7	23:13

2019/7/2	**SHA**	**Mer.pass**
Venus	245°34.1	11:41
Mars	224°28.0	13:04
Jupiter	106°03.5	20:54
Saturn	72°20.3	23:09

2019/7/2	**SHA**	**Mer.pass**
Venus	244°15.2	11:42
Mars	223°49.7	13:02
Jupiter	106°07.5	20:50
Saturn	72°24.8	23:04

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°24.1	20°33.8	312°16.5	15.2	-10°37.5	10.0	54.1
1	193°24.1	20°33.3	326°50.7	15.2	-10°27.5	10.1	54.1
2	208°24.0	20°32.8	341°24.9	15.2	-10°17.4	10.1	54.1
3	223°24.0	20°32.3	355°59.2	15.3	-10°07.3	10.1	54.1
4	238°24.0	20°31.9	10°33.4	15.3	-9°57.1	10.2	54.1
5	253°23.9	20°31.4	25°07.8	15.3	-9°46.9	10.2	54.1
6	268°23.9	20°30.9	39°42.1	15.4	-9°36.7	10.3	54.1
7	283°23.9	20°30.4	54°16.5	15.4	-9°26.4	10.3	54.1
8	298°23.8	20°30.0	68°50.9	15.4	-9°16.1	10.3	54.1
9	313°23.8	20°29.5	83°25.3	15.4	-9°05.8	10.4	54.1
10	328°23.8	20°29.0	97°59.7	15.5	-8°55.4	10.4	54.1
11	343°23.7	20°28.5	112°34.2	15.5	-8°45.0	10.4	54.1
12	358°23.7	20°28.0	127°08.7	15.5	-8°34.5	10.5	54.1
13	13°23.7	20°27.5	141°43.3	15.5	-8°24.0	10.5	54.1
14	28°23.7	20°27.1	156°17.8	15.6	-8°13.5	10.5	54.1
15	43°23.6	20°26.6	170°52.4	15.6	-8°02.9	10.6	54.1
16	58°23.6	20°26.1	185°27.0	15.6	-7°52.4	10.6	54.1
17	73°23.6	20°25.6	200°01.6	15.6	-7°41.7	10.6	54.1
18	88°23.5	20°25.1	214°36.3	15.7	-7°31.1	10.7	54.1
19	103°23.5	20°24.6	229°10.9	15.7	-7°20.4	10.7	54.1
20	118°23.5	20°24.1	243°45.6	15.7	-7°09.7	10.7	54.1
21	133°23.5	20°23.7	258°20.3	15.7	-6°59.0	10.8	54.1
22	148°23.4	20°23.2	272°55.1	15.7	-6°48.2	10.8	54.1
23	163°23.4	20°22.7	287°29.8	15.7	-6°37.4	10.8	54.1
	SD.=15.7	d=-0.5			S.D.=14.8		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°23.4	20°22.2	302°04.5	15.8	-6°26.6	10.8	54.1
1	193°23.4	20°21.7	316°39.3	15.8	-6°15.8	10.9	54.2
2	208°23.3	20°21.2	331°14.1	15.8	-6°04.9	10.9	54.2
3	223°23.3	20°20.7	345°48.9	15.8	-5°54.0	10.9	54.2
4	238°23.3	20°20.2	0°23.7	15.8	-5°43.1	10.9	54.2
5	253°23.2	20°19.7	14°58.6	15.8	-5°32.1	11.0	54.2
6	268°23.2	20°19.2	29°33.4	15.8	-5°21.2	11.0	54.2
7	283°23.2	20°18.8	44°08.3	15.9	-5°10.2	11.0	54.2
8	298°23.2	20°18.3	58°43.1	15.9	-4°59.1	11.0	54.2
9	313°23.1	20°17.8	73°18.0	15.9	-4°48.1	11.0	54.2
10	328°23.1	20°17.3	87°52.9	15.9	-4°37.1	11.1	54.2
11	343°23.1	20°16.8	102°27.8	15.9	-4°26.0	11.1	54.2
12	358°23.1	20°16.3	117°02.6	15.9	-4°14.9	11.1	54.2
13	13°23.1	20°15.8	131°37.5	15.9	-4°03.8	11.1	54.2
14	28°23.0	20°15.3	146°12.4	15.9	-3°52.6	11.1	54.3
15	43°23.0	20°14.8	160°47.4	15.9	-3°41.5	11.2	54.3
16	58°23.0	20°14.3	175°22.3	15.9	-3°30.3	11.2	54.3
17	73°23.0	20°13.8	189°57.2	15.9	-3°19.1	11.2	54.3
18	88°22.9	20°13.3	204°32.1	15.9	-3°07.9	11.2	54.3
19	103°22.9	20°12.8	219°07.0	15.9	-2°56.7	11.2	54.3
20	118°22.9	20°12.3	233°41.9	15.9	-2°45.5	11.2	54.3
21	133°22.9	20°11.8	248°16.9	15.9	-2°34.2	11.3	54.3
22	148°22.8	20°11.3	262°51.8	15.9	-2°23.0	11.3	54.3
23	163°22.8	20°10.8	277°26.7	15.9	-2°11.7	11.3	54.4
	SD.=15.7	d=-0.5			S.D.=14.8		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.8	20°10.3	292°01.6	15.9	-2°00.4	11.3	54.4
1	193°22.8	20°09.8	306°36.5	15.9	-1°49.1	11.3	54.4
2	208°22.8	20°09.3	321°11.4	15.9	-1°37.8	11.3	54.4
3	223°22.7	20°08.8	335°46.3	15.9	-1°26.5	11.3	54.4
4	238°22.7	20°08.3	350°21.2	15.9	-1°15.1	11.3	54.4
5	253°22.7	20°07.7	4°56.1	15.9	-1°03.8	11.3	54.4
6	268°22.7	20°07.2	19°30.9	15.9	-0°52.4	11.4	54.4
7	283°22.7	20°06.7	34°05.8	15.9	-0°41.1	11.4	54.5
8	298°22.6	20°06.2	48°40.6	15.8	-0°29.7	11.4	54.5
9	313°22.6	20°05.7	63°15.5	15.8	-0°18.3	11.4	54.5
10	328°22.6	20°05.2	77°50.3	15.8	-0°06.9	11.4	54.5
11	343°22.6	20°04.7	92°25.1	15.8	0°04.5	11.4	54.5
12	358°22.6	20°04.2	106°59.9	15.8	0°15.9	11.4	54.5
13	13°22.6	20°03.7	121°34.7	15.8	0°27.3	11.4	54.5
14	28°22.5	20°03.2	136°09.4	15.8	0°38.7	11.4	54.6
15	43°22.5	20°02.6	150°44.2	15.7	0°50.1	11.4	54.6
16	58°22.5	20°02.1	165°18.9	15.7	1°01.5	11.4	54.6
17	73°22.5	20°01.6	179°53.6	15.7	1°12.9	11.4	54.6
18	88°22.5	20°01.1	194°28.3	15.7	1°24.3	11.4	54.6
19	103°22.5	20°00.6	209°03.0	15.7	1°35.7	11.4	54.6
20	118°22.4	20°00.1	223°37.6	15.6	1°47.2	11.4	54.7
21	133°22.4	19°59.6	238°12.3	15.6	1°58.6	11.4	54.7
22	148°22.4	19°59.0	252°46.9	15.6	2°10.0	11.4	54.7
23	163°22.4	19°58.5	267°21.4	15.6	2°21.4	11.4	54.7
	SD.=15.7	d=-0.5			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:12	22:54	–:–	–:–
66	–:–	–:–	02:04	22:05	–:–	–:–
64	–:–	–:–	02:36	21:35	–:–	–:–
62	–:–	01:29	02:59	21:12	22:39	–:–
60	–:–	02:07	03:17	20:54	22:04	–:–
58	–:–	02:32	03:33	20:39	21:38	–:–
56	01:22	02:52	03:45	20:26	21:19	22:47
54	01:56	03:09	03:57	20:15	21:03	22:14
52	02:20	03:23	04:07	20:05	20:49	21:51
50	02:39	03:35	04:15	19:57	20:37	21:33
45	03:14	03:59	04:34	19:38	20:13	20:58
40	03:39	04:18	04:49	19:23	19:55	20:33
35	03:58	04:33	05:02	19:11	19:39	20:14
30	04:14	04:46	05:13	18:60	19:26	19:58
20	04:39	05:08	05:32	18:41	19:05	19:33
10	04:59	05:25	05:48	18:25	18:47	19:14
0	05:15	05:41	06:03	18:10	18:32	18:58
-10	05:30	05:55	06:18	17:55	18:18	18:43
-20	05:43	06:10	06:34	17:39	18:03	18:30
-30	05:57	06:26	06:52	17:21	17:47	18:16
-35	06:04	06:35	07:02	17:11	17:38	18:09
-40	06:11	06:44	07:14	16:59	17:29	18:02
-45	06:19	06:56	07:28	16:45	17:18	17:54
-50	06:29	07:09	07:45	16:28	17:05	17:45
-52	06:33	07:15	07:53	16:20	16:59	17:41
-54	06:37	07:21	08:02	16:11	16:52	17:37
-56	06:42	07:28	08:12	16:01	16:45	17:32
-58	06:47	07:36	08:24	15:50	16:37	17:27
-60	06:52	07:45	08:37	15:37	16:28	17:21

		Moonrise			**Moonset**	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	23:15	22:58	22:43	07:20	09:06	10:49
70	23:05	22:55	22:46	07:35	09:13	10:49
68	22:58	22:53	22:48	07:48	09:19	10:49
66	22:51	22:51	22:50	07:58	09:24	10:50
64	22:46	22:49	22:52	08:06	09:28	10:50
62	22:41	22:47	22:54	08:13	09:31	10:50
60	22:37	22:46	22:55	08:19	09:34	10:50
58	22:33	22:45	22:56	08:25	09:37	10:50
56	22:30	22:44	22:57	08:29	09:39	10:50
54	22:27	22:43	22:58	08:34	09:42	10:50
52	22:24	22:42	22:59	08:37	09:43	10:50
50	22:22	22:41	22:60	08:41	09:45	10:50
45	22:17	22:39	23:02	08:48	09:49	10:50
40	22:12	22:38	23:03	08:55	09:52	10:50
35	22:08	22:36	23:05	09:00	09:55	10:50
30	22:05	22:35	23:06	09:05	09:57	10:50
20	21:59	22:33	23:08	09:13	10:01	10:50
10	21:53	22:31	23:10	09:20	10:05	10:50
0	21:48	22:30	23:11	09:27	10:08	10:50
-10	21:43	22:28	23:13	09:33	10:12	10:50
-20	21:38	22:26	23:15	09:40	10:15	10:50
-30	21:32	22:24	23:17	09:48	10:19	10:50
-35	21:28	22:23	23:18	09:53	10:21	10:49
-40	21:24	22:22	23:20	09:58	10:24	10:49
-45	21:20	22:20	23:21	10:04	10:27	10:49
-50	21:14	22:19	23:23	10:11	10:30	10:49
-52	21:12	22:18	23:24	10:14	10:32	10:49
-54	21:09	22:17	23:25	10:18	10:34	10:49
-56	21:06	22:16	23:26	10:21	10:36	10:49
-58	21:02	22:15	23:28	10:26	10:38	10:49
-60	20:58	22:13	23:29	10:31	10:40	10:49

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	06:24	06:25	12:06	03:16	15:37	19(82%)
22	06:27	06:28	12:06	03:58	16:19	20(74%)
23	06:29	06:30	12:06	04:39	17:00	21(65%)

July 24, 25 ,26 (Wed., Thu., Fri.)

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	301°25.7	184°22.3	21°49.6	164°37.1	17°44.5	47°36.9	-22°08.2	13°55.0	-22°09.7
1	316°28.2	199°21.5	21°49.1	179°38.0	17°44.1	62°39.5	-22°08.2	28°57.7	-22°09.7
2	331°30.6	214°20.6	21°48.6	194°38.9	17°43.6	77°42.1	-22°08.1	44°00.3	-22°09.7
3	346°33.1	229°19.8	21°48.1	209°39.8	17°43.2	92°44.8	-22°08.1	59°03.0	-22°09.8
4	1°35.6	244°19.0	21°47.7	224°40.6	17°42.7	107°47.4	-22°08.1	74°05.6	-22°09.8
5	16°38.0	259°18.2	21°47.2	239°41.5	17°42.2	122°50.0	-22°08.1	89°08.3	-22°09.8
6	31°40.5	274°17.4	21°46.7	254°42.4	17°41.8	137°52.6	-22°08.1	104°10.9	-22°09.8
7	46°43.0	289°16.6	21°46.2	269°43.3	17°41.3	152°55.2	-22°08.1	119°13.6	-22°09.9
8	61°45.4	304°15.8	21°45.7	284°44.1	17°40.8	167°57.8	-22°08.1	134°16.2	-22°09.9
9	76°47.9	319°15.0	21°45.3	299°45.0	17°40.4	183°00.4	-22°08.1	149°18.9	-22°09.9
10	91°50.4	334°14.2	21°44.8	314°45.9	17°39.9	198°03.1	-22°08.1	164°21.5	-22°09.9
11	106°52.8	349°13.4	21°44.3	329°46.7	17°39.4	213°05.7	-22°08.1	179°24.2	-22°10.0
12	121°55.3	4°12.6	21°43.8	344°47.6	17°39.0	228°08.3	-22°08.1	194°26.8	-22°10.0
13	136°57.7	19°11.8	21°43.3	359°48.5	17°38.5	243°10.9	-22°08.1	209°29.5	-22°10.0
14	152°00.2	34°11.0	21°42.8	14°49.4	17°38.0	258°13.5	-22°08.1	224°32.1	-22°10.0
15	167°02.7	49°10.2	21°42.4	29°50.2	17°37.6	273°16.1	-22°08.0	239°34.8	-22°10.1
16	182°05.1	64°09.4	21°41.9	44°51.1	17°37.1	288°18.7	-22°08.0	254°37.4	-22°10.1
17	197°07.6	79°08.6	21°41.4	59°52.0	17°36.7	303°21.3	-22°08.0	269°40.1	-22°10.1
18	212°10.1	94°07.7	21°40.9	74°52.9	17°36.2	318°23.9	-22°08.0	284°42.7	-22°10.1
19	227°12.5	109°06.9	21°40.4	89°53.7	17°35.7	333°26.6	-22°08.0	299°45.4	-22°10.2
20	242°15.0	124°06.1	21°39.9	104°54.6	17°35.3	348°29.2	-22°08.0	314°48.0	-22°10.2
21	257°17.5	139°05.3	21°39.4	119°55.5	17°34.8	3°31.8	-22°08.0	329°50.7	-22°10.2
22	272°19.9	154°04.5	21°38.9	134°56.4	17°34.3	18°34.4	-22°08.0	344°53.3	-22°10.2
23	287°22.4	169°03.7	21°38.4	149°57.2	17°33.9	33°37.0	-22°08.0	359°56.0	-22°10.3
Mer.pass.:3:53:		v-0.8 d-0.5 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.7 d-0.0 m0.1	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	302°24.9	184°02.9	21°37.9	164°58.1	17°33.4	48°39.6	-22°08.0	14°58.6	-22°10.3
1	317°27.3	199°02.1	21°37.4	179°59.0	17°32.9	63°42.2	-22°08.0	30°01.3	-22°10.3
2	332°29.8	214°01.3	21°36.9	194°59.8	17°32.4	78°44.8	-22°08.0	45°03.9	-22°10.3
3	347°32.2	229°00.5	21°36.4	210°00.7	17°32.0	93°47.4	-22°08.0	60°06.6	-22°10.4
4	2°34.7	243°59.7	21°35.9	225°01.6	17°31.5	108°50.0	-22°08.0	75°09.2	-22°10.4
5	17°37.2	258°58.9	21°35.4	240°02.5	17°31.0	123°52.6	-22°07.9	90°11.9	-22°10.4
6	32°39.6	273°58.1	21°34.9	255°03.4	17°30.6	138°55.2	-22°07.9	105°14.5	-22°10.4
7	47°42.1	288°57.3	21°34.4	270°04.2	17°30.1	153°57.9	-22°07.9	120°17.2	-22°10.5
8	62°44.6	303°56.5	21°33.9	285°05.1	17°29.6	169°00.5	-22°07.9	135°19.8	-22°10.5
9	77°47.0	318°55.7	21°33.4	300°06.0	17°29.2	184°03.1	-22°07.9	150°22.5	-22°10.5
10	92°49.5	333°54.9	21°32.9	315°06.9	17°28.7	199°05.7	-22°07.9	165°25.1	-22°10.5
11	107°52.0	348°54.1	21°32.4	330°07.7	17°28.2	214°08.3	-22°07.9	180°27.8	-22°10.6
12	122°54.4	3°53.3	21°31.9	345°08.6	17°27.8	229°10.9	-22°07.9	195°30.4	-22°10.6
13	137°56.9	18°52.5	21°31.3	0°09.5	17°27.3	244°13.5	-22°07.9	210°33.1	-22°10.6
14	152°59.4	33°51.7	21°30.8	15°10.4	17°26.8	259°16.1	-22°07.9	225°35.7	-22°10.6
15	168°01.8	48°50.9	21°30.3	30°11.2	17°26.3	274°18.7	-22°07.9	240°38.4	-22°10.7
16	183°04.3	63°50.1	21°29.8	45°12.1	17°25.9	289°21.3	-22°07.9	255°41.0	-22°10.7
17	198°06.7	78°49.4	21°29.3	60°13.0	17°25.4	304°23.9	-22°07.9	270°43.7	-22°10.7
18	213°09.2	93°48.6	21°28.8	75°13.9	17°24.9	319°26.5	-22°07.9	285°46.3	-22°10.7
19	228°11.7	108°47.8	21°28.2	90°14.7	17°24.5	334°29.1	-22°07.9	300°49.0	-22°10.8
20	243°14.1	123°47.0	21°27.7	105°15.6	17°24.0	349°31.7	-22°07.8	315°51.6	-22°10.8
21	258°16.6	138°46.2	21°27.2	120°16.5	17°23.5	4°34.3	-22°07.8	330°54.3	-22°10.8
22	273°19.1	153°45.4	21°26.7	135°17.4	17°23.0	19°36.9	-22°07.8	345°56.9	-22°10.8
23	288°21.5	168°44.6	21°26.2	150°18.3	17°22.6	34°39.5	-22°07.8	0°59.6	-22°10.9
Mer.pass.:3:49:		v-0.8 d-0.5 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	303°24.0	183°43.8	21°25.6	165°19.1	17°22.1	49°42.1	-22°07.8	16°02.2	-22°10.9
1	318°26.5	198°43.0	21°25.1	180°20.0	17°21.6	64°44.7	-22°07.8	31°04.9	-22°10.9
2	333°28.9	213°42.2	21°24.6	195°20.9	17°21.2	79°47.3	-22°07.8	46°07.5	-22°10.9
3	348°31.4	228°41.4	21°24.1	210°21.8	17°20.7	94°49.9	-22°07.8	61°10.2	-22°10.9
4	3°33.8	243°40.6	21°23.5	225°22.6	17°20.2	109°52.5	-22°07.8	76°12.8	-22°11.0
5	18°36.3	258°39.8	21°23.0	240°23.5	17°19.7	124°55.1	-22°07.8	91°15.5	-22°11.0
6	33°38.8	273°39.0	21°22.5	255°24.4	17°19.3	139°57.7	-22°07.8	106°18.1	-22°11.0
7	48°41.2	288°38.2	21°21.9	270°25.3	17°18.8	155°00.3	-22°07.8	121°20.8	-22°11.0
8	63°43.7	303°37.5	21°21.4	285°26.2	17°18.3	170°02.9	-22°07.8	136°23.4	-22°11.1
9	78°46.2	318°36.7	21°20.9	300°27.0	17°17.8	185°05.5	-22°07.8	151°26.0	-22°11.1
10	93°48.6	333°35.9	21°20.3	315°27.9	17°17.4	200°08.1	-22°07.8	166°28.7	-22°11.1
11	108°51.1	348°35.1	21°19.8	330°28.8	17°16.9	215°10.7	-22°07.8	181°31.3	-22°11.1
12	123°53.6	3°34.3	21°19.3	345°29.7	17°16.4	230°13.3	-22°07.8	196°34.0	-22°11.2
13	138°56.0	18°33.5	21°18.7	0°30.6	17°15.9	245°15.9	-22°07.7	211°36.6	-22°11.2
14	153°58.5	33°32.7	21°18.2	15°31.4	17°15.5	260°18.5	-22°07.7	226°39.3	-22°11.2
15	169°01.0	48°31.9	21°17.6	30°32.3	17°15.0	275°21.1	-22°07.7	241°41.9	-22°11.2
16	184°03.4	63°31.1	21°17.1	45°33.2	17°14.5	290°23.7	-22°07.7	256°44.6	-22°11.3
17	199°05.9	78°30.4	21°16.6	60°34.1	17°14.0	305°26.3	-22°07.7	271°47.2	-22°11.3
18	214°08.3	93°29.6	21°16.0	75°35.0	17°13.6	320°28.9	-22°07.7	286°49.9	-22°11.3
19	229°10.8	108°28.8	21°15.5	90°35.8	17°13.1	335°31.5	-22°07.7	301°52.5	-22°11.3
20	244°13.3	123°28.0	21°14.9	105°36.7	17°12.6	350°34.1	-22°07.7	316°55.2	-22°11.4
21	259°15.7	138°27.2	21°14.4	120°37.6	17°12.1	5°36.7	-22°07.7	331°57.8	-22°11.4
22	274°18.2	153°26.4	21°13.8	135°38.5	17°11.7	20°39.2	-22°07.7	347°00.5	-22°11.4
23	289°20.7	168°25.6	21°13.3	150°39.4	17°11.2	35°41.8	-22°07.7	2°03.1	-22°11.4
Mer.pass.:3:45:		v-0.8 d-0.5 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Stars

Star	SHA	Dec
Alpheratz	357°39.0	29°11.7
Ankaa	353°11.4	-42°11.8
Schedar	349°35.6	56°38.3
Diphda	348°51.5	-17°52.7
Achernar	335°23.6	-57°08.1
Hamal	327°56.1	23°33.1
Polaris	316°03.7	89°20.4
Akamar	315°15.3	-40°13.5
Menkar	314°10.8	4°09.9
Mirfak	308°34.5	49°55.5
Aldebaran	290°44.8	16°32.8
Rigel	281°08.3	-8°10.8
Capella	280°28.7	46°00.8
Bellatrix	278°27.8	6°21.9
Elnath	278°07.6	28°37.3
Alnilam	275°42.4	-1°11.4
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.8	-52°42.3
Sirius	258°30.3	-16°44.4
Adara	255°09.6	-28°59.9
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.3
Suhail	222°49.8	-43°30.7
Miaplacidus	221°39.8	-69°47.9
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.0	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°38.9
Acrux	173°05.0	-63°12.6
Gacrux	171°56.5	-57°13.5
Alioth	166°17.2	55°51.6
Spica	158°26.9	-11°15.6
Alcaid	152°55.6	49°13.4
Hadar	148°41.9	-60°28.1
Menkent	148°02.6	-36°27.9
Arcturus	145°51.7	19°05.5
Rigil Kent.	139°45.9	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.8	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.5	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.1	-56°40.2
Deneb	49°28.2	45°21.0
Enif	33°42.7	9°57.9
Alnair	27°38.1	-46°51.8
Fomalhaut	15°19.2	-29°31.0
Scheat	13°49.1	28°11.2
Markab	13°33.9	15°18.6

2019/7/2	SHA	Mer.pass
Venus	242°56.6	11:43
Mars	223°11.4	13:01
Jupiter	106°11.2	20:46
Saturn	72°29.3	23:00

2019/7/2	SHA	Mer.pass
Venus	241°38.1	11:44
Mars	222°33.2	12:59
Jupiter	106°14.8	20:42
Saturn	72°33.8	22:56

2019/7/2	SHA	Mer.pass
Venus	240°19.8	11:46
Mars	221°55.1	12:58
Jupiter	106°18.1	20:38
Saturn	72°38.2	22:52

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.4	19°58.0	281°56.0	15.5	2°32.8	11.4	54.7
1	193°22.4	19°57.5	296°30.5	15.5	2°44.2	11.4	54.8
2	208°22.3	19°57.0	311°05.0	15.5	2°55.7	11.4	54.8
3	223°22.3	19°56.5	325°39.5	15.5	3°07.1	11.4	54.8
4	238°22.3	19°55.9	340°13.9	15.4	3°18.5	11.4	54.8
5	253°22.3	19°55.4	354°48.3	15.4	3°29.9	11.4	54.8
6	268°22.3	19°54.9	9°22.7	15.4	3°41.2	11.4	54.9
7	283°22.3	19°54.4	23°57.0	15.3	3°52.6	11.4	54.9
8	298°22.3	19°53.9	38°31.3	15.3	4°04.0	11.4	54.9
9	313°22.2	19°53.3	53°05.6	15.3	4°15.4	11.4	54.9
10	328°22.2	19°52.8	67°39.8	15.2	4°26.7	11.4	54.9
11	343°22.2	19°52.3	82°14.0	15.2	4°38.1	11.3	55.0
12	358°22.2	19°51.8	96°48.2	15.1	4°49.4	11.3	55.0
13	13°22.2	19°51.2	111°22.3	15.1	5°00.8	11.3	55.0
14	28°22.2	19°50.7	125°56.4	15.1	5°12.1	11.3	55.0
15	43°22.2	19°50.2	140°30.5	15.0	5°23.4	11.3	55.1
16	58°22.2	19°49.7	155°04.5	15.0	5°34.7	11.3	55.1
17	73°22.2	19°49.1	169°38.4	14.9	5°46.0	11.3	55.1
18	88°22.1	19°48.6	184°12.4	14.9	5°57.2	11.3	55.1
19	103°22.1	19°48.1	198°46.2	14.9	6°08.5	11.2	55.2
20	118°22.1	19°47.5	213°20.1	14.8	6°19.7	11.2	55.2
21	133°22.1	19°47.0	227°53.8	14.8	6°31.0	11.2	55.2
22	148°22.1	19°46.5	242°27.6	14.7	6°42.2	11.2	55.2
23	163°22.1	19°45.9	257°01.3	14.7	6°53.3	11.2	55.3
	SD.=15.7	d=-0.5			S.D.=14.9		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.1	19°45.4	271°34.9	14.6	7°04.5	11.2	55.3
1	193°22.1	19°44.9	286°08.5	14.6	7°15.7	11.1	55.3
2	208°22.1	19°44.4	300°42.0	14.5	7°26.8	11.1	55.3
3	223°22.1	19°43.8	315°15.5	14.5	7°37.9	11.1	55.4
4	238°22.1	19°43.3	329°49.0	14.4	7°49.0	11.1	55.4
5	253°22.0	19°42.8	344°22.3	14.4	8°00.1	11.1	55.4
6	268°22.0	19°42.2	358°55.7	14.3	8°11.1	11.0	55.4
7	283°22.0	19°41.7	13°28.9	14.2	8°22.1	11.0	55.5
8	298°22.0	19°41.1	28°02.2	14.2	8°33.1	11.0	55.5
9	313°22.0	19°40.6	42°35.3	14.1	8°44.1	11.0	55.5
10	328°22.0	19°40.1	57°08.4	14.1	8°55.0	10.9	55.5
11	343°22.0	19°39.5	71°41.4	14.0	9°05.9	10.9	55.6
12	358°22.0	19°39.0	86°14.4	13.9	9°16.8	10.9	55.6
13	13°22.0	19°38.5	100°47.3	13.9	9°27.7	10.8	55.6
14	28°22.0	19°37.9	115°20.2	13.8	9°38.5	10.8	55.7
15	43°22.0	19°37.4	129°53.0	13.8	9°49.3	10.8	55.7
16	58°22.0	19°36.8	144°25.7	13.7	10°00.1	10.7	55.7
17	73°22.0	19°36.3	158°58.4	13.6	10°10.8	10.7	55.8
18	88°22.0	19°35.8	173°31.0	13.6	10°21.5	10.7	55.8
19	103°22.0	19°35.2	188°03.5	13.5	10°32.2	10.6	55.8
20	118°22.0	19°34.7	202°35.9	13.4	10°42.8	10.6	55.8
21	133°21.9	19°34.1	217°08.3	13.4	10°53.4	10.6	55.9
22	148°21.9	19°33.6	231°40.6	13.3	11°03.9	10.5	55.9
23	163°21.9	19°33.0	246°12.9	13.2	11°14.5	10.5	55.9
	SD.=15.7	d=-0.5			S.D.=15.1		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°21.9	19°32.5	260°45.1	13.1	11°24.9	10.5	56.0
1	193°21.9	19°31.9	275°17.2	13.1	11°35.4	10.4	56.0
2	208°21.9	19°31.4	289°49.2	13.0	11°45.8	10.4	56.0
3	223°21.9	19°30.9	304°21.2	12.9	11°56.1	10.3	56.1
4	238°21.9	19°30.3	318°53.1	12.8	12°06.4	10.3	56.1
5	253°21.9	19°29.8	333°24.9	12.8	12°16.7	10.2	56.1
6	268°21.9	19°29.2	347°56.6	12.7	12°26.9	10.2	56.2
7	283°21.9	19°28.7	2°28.2	12.6	12°37.1	10.2	56.2
8	298°21.9	19°28.1	16°59.8	12.5	12°47.3	10.1	56.2
9	313°21.9	19°27.6	31°31.3	12.5	12°57.3	10.1	56.3
10	328°21.9	19°27.0	46°02.7	12.4	13°07.4	10.0	56.3
11	343°21.9	19°26.5	60°34.1	12.3	13°17.4	10.0	56.3
12	358°21.9	19°25.9	75°05.3	12.2	13°27.3	9.9	56.4
13	13°21.9	19°25.4	89°36.5	12.1	13°37.2	9.9	56.4
14	28°21.9	19°24.8	104°07.6	12.0	13°47.0	9.8	56.4
15	43°21.9	19°24.3	118°38.6	12.0	13°56.8	9.8	56.5
16	58°21.9	19°23.7	133°09.5	11.9	14°06.5	9.7	56.5
17	73°21.9	19°23.1	147°40.3	11.8	14°16.2	9.6	56.5
18	88°21.9	19°22.6	162°11.1	11.7	14°25.8	9.6	56.6
19	103°21.9	19°22.0	176°41.7	11.6	14°35.4	9.5	56.6
20	118°21.9	19°21.5	191°12.3	11.5	14°44.8	9.5	56.6
21	133°21.9	19°20.9	205°42.8	11.4	14°54.3	9.4	56.7
22	148°21.9	19°20.4	220°13.2	11.4	15°03.6	9.3	56.7
23	163°21.9	19°19.8	234°43.5	11.3	15°13.0	9.3	56.7
	SD.=15.7	d=-0.5			S.D.=15.3		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	01:33	22:34	–:–	–:–
66	–:–	–:–	02:16	21:53	–:–	–:–
64	–:–	00:40	02:45	21:26	23:22	–:–
62	–:–	01:44	03:07	21:05	22:25	–:–
60	–:–	02:17	03:24	20:48	21:54	–:–
58	00:37	02:40	03:38	20:33	21:31	23:26
56	01:35	02:59	03:51	20:21	21:12	22:35
54	02:05	03:14	04:01	20:11	20:57	22:06
52	02:27	03:28	04:11	20:01	20:44	21:44
50	02:45	03:39	04:19	19:53	20:33	21:27
45	03:18	04:02	04:37	19:35	20:10	20:54
40	03:42	04:21	04:52	19:21	19:52	20:30
35	04:01	04:36	05:04	19:09	19:37	20:11
30	04:16	04:48	05:15	18:58	19:24	19:56
20	04:41	05:09	05:33	18:40	19:04	19:32
10	04:60	05:26	05:48	18:25	18:47	19:13
0	05:16	05:41	06:03	18:10	18:32	18:58
-10	05:29	05:55	06:17	17:56	18:18	18:44
-20	05:43	06:09	06:33	17:41	18:04	18:31
-30	05:55	06:25	06:50	17:23	17:49	18:18
-35	06:02	06:33	07:00	17:13	17:40	18:11
-40	06:09	06:42	07:12	17:02	17:31	18:04
-45	06:17	06:53	07:25	16:48	17:21	17:56
-50	06:26	07:05	07:41	16:32	17:08	17:48
-52	06:29	07:11	07:49	16:24	17:03	17:44
-54	06:33	07:17	07:58	16:16	16:56	17:40
-56	06:38	07:24	08:07	16:06	16:50	17:36
-58	06:42	07:32	08:18	15:55	16:42	17:31
-60	06:48	07:40	08:31	15:43	16:33	17:26

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
72	22:26	22:07	21:39	12:34	14:25	16:30
70	22:36	22:25	22:10	12:27	14:09	16:00
68	22:43	22:39	22:34	12:21	13:57	15:38
66	22:50	22:50	22:52	12:16	13:46	15:21
64	22:55	23:00	23:07	12:12	13:38	15:07
62	23:00	23:08	23:19	12:09	13:31	14:55
60	23:04	23:16	23:30	12:06	13:24	14:45
58	23:08	23:22	23:39	12:03	13:19	14:37
56	23:11	23:28	23:48	12:01	13:14	14:29
54	23:14	23:33	23:55	11:59	13:10	14:23
52	23:17	23:37	–:–	11:57	13:06	14:17
50	23:20	23:42	–:–	11:55	13:02	14:11
45	23:25	23:51	–:–	11:51	12:54	13:60
40	23:30	23:59	–:–	11:48	12:48	13:50
35	23:34	–:–	00:05	11:45	12:42	13:42
30	23:37	–:–	00:11	11:43	12:38	13:35
20	23:43	–:–	00:21	11:39	12:29	13:22
10	23:49	–:–	00:30	11:35	12:22	13:11
0	23:54	–:–	00:39	11:32	12:15	13:01
-10	23:59	–:–	00:47	11:28	12:08	12:51
-20	–:–	00:05	00:56	11:24	12:01	12:40
-30	–:–	00:11	01:07	11:20	11:53	12:28
-35	–:–	00:15	01:13	11:18	11:48	12:21
-40	–:–	00:19	01:20	11:15	11:43	12:13
-45	–:–	00:24	01:28	11:12	11:36	12:04
-50	–:–	00:30	01:38	11:08	11:29	11:52
-52	–:–	00:32	01:42	11:07	11:26	11:47
-54	–:–	00:35	01:48	11:05	11:22	11:42
-56	–:–	00:39	01:53	11:03	11:18	11:35
-58	–:–	00:42	01:59	11:01	11:13	11:28
-60	–:–	00:47	02:07	10:58	11:08	11:20

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	06:31	06:31	12:06	05:21	17:42	22(56%)
25	06:32	06:32	12:06	06:04	18:26	23(46%)
26	06:32	06:32	12:06	06:49	19:13	24(36%)

July 27, 28 ,29 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	304°23.1	183°24.9	21°12.7	165°40.2	17°10.7	50°44.4	-22°07.7	17°05.8	-22°11.5
1	319°25.6	198°24.1	21°12.2	180°41.1	17°10.2	65°47.0	-22°07.7	32°08.4	-22°11.5
2	334°28.1	213°23.3	21°11.6	195°42.0	17°09.8	80°49.6	-22°07.7	47°11.1	-22°11.5
3	349°30.5	228°22.5	21°11.1	210°42.9	17°09.3	95°52.2	-22°07.7	62°13.7	-22°11.5
4	4°33.0	243°21.7	21°10.5	225°43.8	17°08.8	110°54.8	-22°07.7	77°16.3	-22°11.6
5	19°35.5	258°20.9	21°10.0	240°44.6	17°08.3	125°57.4	-22°07.7	92°19.0	-22°11.6
6	34°37.9	273°20.2	21°09.4	255°45.5	17°07.8	140°60.0	-22°07.7	107°21.6	-22°11.6
7	49°40.4	288°19.4	21°08.9	270°46.4	17°07.4	156°02.6	-22°07.6	122°24.3	-22°11.6
8	64°42.8	303°18.6	21°08.3	285°47.3	17°06.9	171°05.2	-22°07.6	137°26.9	-22°11.6
9	79°45.3	318°17.8	21°07.7	300°48.2	17°06.4	186°07.8	-22°07.6	152°29.6	-22°11.7
10	94°47.8	333°17.0	21°07.2	315°49.1	17°05.9	201°10.3	-22°07.6	167°32.2	-22°11.7
11	109°50.2	348°16.3	21°06.6	330°49.9	17°05.4	216°12.9	-22°07.6	182°34.9	-22°11.7
12	124°52.7	3°15.5	21°06.1	345°50.8	17°05.0	231°15.5	-22°07.6	197°37.5	-22°11.7
13	139°55.2	18°14.7	21°05.5	0°51.7	17°04.5	246°18.1	-22°07.6	212°40.2	-22°11.8
14	154°57.6	33°13.9	21°04.9	15°52.6	17°04.0	261°20.7	-22°07.6	227°42.8	-22°11.8
15	170°00.1	48°13.1	21°04.4	30°53.5	17°03.5	276°23.3	-22°07.6	242°45.5	-22°11.8
16	185°02.6	63°12.4	21°03.8	45°54.3	17°03.0	291°25.9	-22°07.6	257°48.1	-22°11.8
17	200°05.0	78°11.6	21°03.2	60°55.2	17°02.6	306°28.5	-22°07.6	272°50.7	-22°11.9
18	215°07.5	93°10.8	21°02.7	75°56.1	17°02.1	321°31.1	-22°07.6	287°53.4	-22°11.9
19	230°10.0	108°10.0	21°02.1	90°57.0	17°01.6	336°33.6	-22°07.6	302°56.0	-22°11.9
20	245°12.4	123°09.2	21°01.5	105°57.9	17°01.1	351°36.2	-22°07.6	317°58.7	-22°11.9
21	260°14.9	138°08.5	21°00.9	120°58.8	17°00.6	6°38.8	-22°07.6	333°01.3	-22°12.0
22	275°17.3	153°07.7	21°00.4	135°59.6	17°00.2	21°41.4	-22°07.6	348°04.0	-22°12.0
23	290°19.8	168°06.9	20°59.8	151°00.5	16°59.7	36°44.0	-22°07.6	3°06.6	-22°12.0
Mer.pass.:3:41:		v-0.8 d-0.6 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	305°22.3	183°06.1	20°59.2	166°01.4	16°59.2	51°46.6	-22°07.6	18°09.3	-22°12.0
1	320°24.7	198°05.4	20°58.6	181°02.3	16°58.7	66°49.2	-22°07.6	33°11.9	-22°12.1
2	335°27.2	213°04.6	20°58.1	196°03.2	16°58.2	81°51.7	-22°07.6	48°14.5	-22°12.1
3	350°29.7	228°03.8	20°57.5	211°04.1	16°57.8	96°54.3	-22°07.5	63°17.2	-22°12.1
4	5°32.1	243°03.0	20°56.9	226°05.0	16°57.3	111°56.9	-22°07.5	78°19.8	-22°12.1
5	20°34.6	258°02.3	20°56.3	241°05.8	16°56.8	126°59.5	-22°07.5	93°22.5	-22°12.2
6	35°37.1	273°01.5	20°55.7	256°06.7	16°56.3	142°02.1	-22°07.5	108°25.1	-22°12.2
7	50°39.5	288°00.7	20°55.2	271°07.6	16°55.8	157°04.7	-22°07.5	123°27.8	-22°12.2
8	65°42.0	302°60.0	20°54.6	286°08.5	16°55.3	172°07.2	-22°07.5	138°30.4	-22°12.2
9	80°44.4	317°59.2	20°54.0	301°09.4	16°54.9	187°09.8	-22°07.5	153°33.1	-22°12.2
10	95°46.9	332°58.4	20°53.4	316°10.3	16°54.4	202°12.4	-22°07.5	168°35.7	-22°12.3
11	110°49.4	347°57.6	20°52.8	331°11.1	16°53.9	217°15.0	-22°07.5	183°38.3	-22°12.3
12	125°51.8	2°56.9	20°52.2	346°12.0	16°53.4	232°17.6	-22°07.5	198°41.0	-22°12.3
13	140°54.3	17°56.1	20°51.6	1°12.9	16°52.9	247°20.1	-22°07.5	213°43.6	-22°12.3
14	155°56.8	32°55.3	20°51.1	16°13.8	16°52.4	262°22.7	-22°07.5	228°46.3	-22°12.4
15	170°59.2	47°54.6	20°50.5	31°14.7	16°51.9	277°25.3	-22°07.5	243°48.9	-22°12.4
16	186°01.7	62°53.8	20°49.9	46°15.6	16°51.5	292°27.9	-22°07.5	258°51.6	-22°12.4
17	201°04.2	77°53.0	20°49.3	61°16.5	16°51.0	307°30.5	-22°07.5	273°54.2	-22°12.4
18	216°06.6	92°52.3	20°48.7	76°17.4	16°50.5	322°33.0	-22°07.5	288°56.9	-22°12.5
19	231°09.1	107°51.5	20°48.1	91°18.2	16°50.0	337°35.6	-22°07.5	303°59.5	-22°12.5
20	246°11.6	122°50.7	20°47.5	106°19.1	16°49.5	352°38.2	-22°07.5	319°02.1	-22°12.5
21	261°14.0	137°50.0	20°46.9	121°20.0	16°49.0	7°40.8	-22°07.5	334°04.8	-22°12.5
22	276°16.5	152°49.2	20°46.3	136°20.9	16°48.6	22°43.4	-22°07.5	349°07.4	-22°12.6
23	291°18.9	167°48.4	20°45.7	151°21.8	16°48.1	37°45.9	-22°07.5	4°10.1	-22°12.6
Mer.pass.:3:37:		v-0.8 d-0.6 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	306°21.4	182°47.7	20°45.1	166°22.7	16°47.6	52°48.5	-22°07.5	19°12.7	-22°12.6
1	321°23.9	197°46.9	20°44.5	181°23.6	16°47.1	67°51.1	-22°07.5	34°15.4	-22°12.6
2	336°26.3	212°46.1	20°43.9	196°24.4	16°46.6	82°53.7	-22°07.5	49°18.0	-22°12.7
3	351°28.8	227°45.4	20°43.3	211°25.3	16°46.1	97°56.2	-22°07.5	64°20.6	-22°12.7
4	6°31.3	242°44.6	20°42.7	226°26.2	16°45.6	112°58.8	-22°07.4	79°23.3	-22°12.7
5	21°33.7	257°43.8	20°42.1	241°27.1	16°45.1	128°01.4	-22°07.4	94°25.9	-22°12.7
6	36°36.2	272°43.1	20°41.5	256°28.0	16°44.7	143°04.0	-22°07.4	109°28.6	-22°12.7
7	51°38.7	287°42.3	20°40.9	271°28.9	16°44.2	158°06.5	-22°07.4	124°31.2	-22°12.8
8	66°41.1	302°41.5	20°40.3	286°29.8	16°43.7	173°09.1	-22°07.4	139°33.9	-22°12.8
9	81°43.6	317°40.8	20°39.6	301°30.7	16°43.2	188°11.7	-22°07.4	154°36.5	-22°12.8
10	96°46.1	332°40.0	20°39.0	316°31.5	16°42.7	203°14.3	-22°07.4	169°39.1	-22°12.8
11	111°48.5	347°39.3	20°38.4	331°32.4	16°42.2	218°16.8	-22°07.4	184°41.8	-22°12.9
12	126°51.0	2°38.5	20°37.8	346°33.3	16°41.7	233°19.4	-22°07.4	199°44.4	-22°12.9
13	141°53.4	17°37.7	20°37.2	1°34.2	16°41.2	248°22.0	-22°07.4	214°47.1	-22°12.9
14	156°55.9	32°37.0	20°36.6	16°35.1	16°40.7	263°24.6	-22°07.4	229°49.7	-22°12.9
15	171°58.4	47°36.2	20°36.0	31°36.0	16°40.3	278°27.1	-22°07.4	244°52.4	-22°13.0
16	187°00.8	62°35.5	20°35.3	46°36.9	16°39.8	293°29.7	-22°07.4	259°55.0	-22°13.0
17	202°03.3	77°34.7	20°34.7	61°37.8	16°39.3	308°32.3	-22°07.4	274°57.6	-22°13.0
18	217°05.8	92°33.9	20°34.1	76°38.7	16°38.8	323°34.8	-22°07.4	290°00.3	-22°13.0
19	232°08.2	107°33.2	20°33.5	91°39.6	16°38.3	338°37.4	-22°07.4	305°02.9	-22°13.1
20	247°10.7	122°32.4	20°32.9	106°40.4	16°37.8	353°40.0	-22°07.4	320°05.6	-22°13.1
21	262°13.2	137°31.7	20°32.2	121°41.3	16°37.3	8°42.5	-22°07.4	335°08.2	-22°13.1
22	277°15.6	152°30.9	20°31.6	136°42.2	16°36.8	23°45.1	-22°07.4	350°10.9	-22°13.1
23	292°18.1	167°30.1	20°31.0	151°43.1	16°36.3	38°47.7	-22°07.4	5°13.5	-22°13.1
Mer.pass.:3:33:		v-0.8 d-0.6 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Stars

	SHA	Dec
Alpheratz	357°39.0	29°11.8
Ankaa	353°11.3	-42°11.8
Schedar	349°35.5	56°38.3
Diphda	348°51.4	-17°52.7
Achernar	335°23.6	-57°08.1
Hamal	327°56.0	23°33.1
Polaris	316°02.1	89°20.4
Akamar	315°15.2	-40°13.5
Menkar	314°10.7	4°09.9
Mirfak	308°34.5	49°55.5
Aldebaran	290°44.8	16°32.8
Rigel	281°08.3	-8°10.8
Capella	280°28.6	46°00.8
Bellatrix	278°27.8	6°21.9
Elnath	278°07.6	28°37.3
Alnilam	275°42.4	-1°11.4
Betelgeuse	270°57.1	7°24.5
Canopus	263°54.8	-52°42.3
Sirius	258°30.3	-16°44.4
Adara	255°09.6	-28°59.9
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.3
Suhail	222°49.8	-43°30.7
Miaplacidus	221°39.8	-69°47.9
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°38.9
Acrux	173°05.0	-63°12.6
Gacrux	171°56.5	-57°13.5
Alioth	166°17.2	55°51.6
Spica	158°26.9	-11°15.6
Alcaid	152°55.6	49°13.4
Hadar	148°42.0	-60°28.1
Menkent	148°02.7	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.0	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.9	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.6	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.0
Etamin	90°43.7	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.0	-56°40.2
Deneb	49°28.2	45°21.1
Enif	33°42.7	9°57.9
Alnair	27°38.1	-46°51.8
Fomalhaut	15°19.1	-29°31.0
Scheat	13°49.1	28°11.2
Markab	13°33.9	15°18.6

2019/7/2	SHA	Mer.pass
Venus	239°01.7	11:47
Mars	221°17.1	12:57
Jupiter	106°21.3	20:33
Saturn	72°42.6	22:48

2019/7/2	SHA	Mer.pass
Venus	237°43.9	11:48
Mars	220°39.1	12:55
Jupiter	106°24.3	20:29
Saturn	72°47.0	22:43

2019/7/2	SHA	Mer.pass
Venus	236°26.2	11:49
Mars	220°01.3	12:54
Jupiter	106°27.1	20:25
Saturn	72°51.3	22:39

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°21.9	19°19.2	249°13.7	11.2	15°22.2	9.2	56.8
1	193°21.9	19°18.7	263°43.8	11.1	15°31.4	9.1	56.8
2	208°21.9	19°18.1	278°13.9	11.0	15°40.5	9.1	56.9
3	223°21.9	19°17.6	292°43.8	10.9	15°49.5	9.0	56.9
4	238°22.0	19°17.0	307°13.7	10.8	15°58.5	8.9	56.9
5	253°22.0	19°16.4	321°43.4	10.7	16°07.4	8.9	57.0
6	268°22.0	19°15.9	336°13.1	10.6	16°16.2	8.8	57.0
7	283°22.0	19°15.3	350°42.7	10.5	16°25.0	8.7	57.0
8	298°22.0	19°14.8	5°12.1	10.4	16°33.7	8.6	57.1
9	313°22.0	19°14.2	19°41.5	10.3	16°42.3	8.6	57.1
10	328°22.0	19°13.6	34°10.8	10.2	16°50.8	8.5	57.2
11	343°22.0	19°13.1	48°40.0	10.1	16°59.3	8.4	57.2
12	358°22.0	19°12.5	63°09.1	10.0	17°07.7	8.3	57.2
13	13°22.0	19°11.9	77°38.1	10.0	17°16.0	8.3	57.3
14	28°22.0	19°11.4	92°07.0	9.9	17°24.2	8.2	57.3
15	43°22.0	19°10.8	106°35.8	9.8	17°32.3	8.1	57.3
16	58°22.0	19°10.2	121°04.5	9.7	17°40.4	8.0	57.4
17	73°22.0	19°09.7	135°33.1	9.6	17°48.3	7.9	57.4
18	88°22.0	19°09.1	150°01.6	9.5	17°56.2	7.8	57.5
19	103°22.0	19°08.5	164°30.1	9.4	18°04.0	7.7	57.5
20	118°22.0	19°08.0	178°58.4	9.3	18°11.7	7.7	57.5
21	133°22.1	19°07.4	193°26.6	9.2	18°19.3	7.6	57.6
22	148°22.1	19°06.8	207°54.7	9.1	18°26.9	7.5	57.6
23	163°22.1	19°06.3	222°22.7	9.0	18°34.3	7.4	57.7
	SD.=15.7	d=-0.6			S.D.=15.5		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.1	19°05.7	236°50.7	8.9	18°41.6	7.3	57.7
1	193°22.1	19°05.1	251°18.5	8.8	18°48.9	7.2	57.7
2	208°22.1	19°04.5	265°46.2	8.7	18°56.0	7.1	57.8
3	223°22.1	19°04.0	280°13.8	8.6	19°03.0	7.0	57.8
4	238°22.1	19°03.4	294°41.4	8.5	19°10.0	6.9	57.8
5	253°22.1	19°02.8	309°08.8	8.4	19°16.8	6.8	57.9
6	268°22.1	19°02.2	323°36.1	8.3	19°23.6	6.7	57.9
7	283°22.1	19°01.7	338°03.4	8.2	19°30.2	6.6	58.0
8	298°22.2	19°01.1	352°30.5	8.1	19°36.8	6.5	58.0
9	313°22.2	19°00.5	6°57.5	8.0	19°43.2	6.4	58.0
10	328°22.2	18°59.9	21°24.5	7.9	19°49.5	6.3	58.1
11	343°22.2	18°59.4	35°51.3	7.8	19°55.7	6.2	58.1
12	358°22.2	18°58.8	50°18.1	7.7	20°01.8	6.0	58.2
13	13°22.2	18°58.2	64°44.7	7.6	20°07.8	5.9	58.2
14	28°22.2	18°57.6	79°11.3	7.5	20°13.7	5.8	58.2
15	43°22.2	18°57.0	93°37.8	7.4	20°19.5	5.7	58.3
16	58°22.3	18°56.5	108°04.1	7.3	20°25.1	5.6	58.3
17	73°22.3	18°55.9	122°30.4	7.2	20°30.6	5.5	58.4
18	88°22.3	18°55.3	136°56.6	7.1	20°36.1	5.4	58.4
19	103°22.3	18°54.7	151°22.6	7.0	20°41.4	5.2	58.4
20	118°22.3	18°54.1	165°48.6	6.9	20°46.5	5.1	58.5
21	133°22.3	18°53.5	180°14.5	6.9	20°51.6	5.0	58.5
22	148°22.3	18°53.0	194°40.3	6.8	20°56.5	4.9	58.5
23	163°22.4	18°52.4	209°06.1	6.7	21°01.3	4.7	58.6
	SD.=15.7	d=-0.6			S.D.=15.7		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°22.4	18°51.8	223°31.7	6.6	21°06.0	4.6	58.6
1	193°22.4	18°51.2	237°57.2	6.5	21°10.6	4.5	58.7
2	208°22.4	18°50.6	252°22.7	6.4	21°15.0	4.4	58.7
3	223°22.4	18°50.0	266°48.0	6.3	21°19.3	4.2	58.7
4	238°22.4	18°49.5	281°13.3	6.2	21°23.5	4.1	58.8
5	253°22.4	18°48.9	295°38.5	6.1	21°27.5	4.0	58.8
6	268°22.5	18°48.3	310°03.6	6.1	21°31.4	3.8	58.8
7	283°22.5	18°47.7	324°28.6	6.0	21°35.2	3.7	58.9
8	298°22.5	18°47.1	338°53.6	5.9	21°38.8	3.6	58.9
9	313°22.5	18°46.5	353°18.4	5.8	21°42.3	3.4	59.0
10	328°22.5	18°45.9	7°43.2	5.7	21°45.7	3.3	59.0
11	343°22.5	18°45.3	22°07.9	5.7	21°48.9	3.2	59.0
12	358°22.6	18°44.7	36°32.5	5.6	21°52.0	3.0	59.1
13	13°22.6	18°44.1	50°57.1	5.5	21°54.9	2.9	59.1
14	28°22.6	18°43.6	65°21.5	5.4	21°57.7	2.7	59.1
15	43°22.6	18°43.0	79°45.9	5.4	22°00.4	2.6	59.2
16	58°22.6	18°42.4	94°10.3	5.3	22°02.9	2.4	59.2
17	73°22.7	18°41.8	108°34.5	5.2	22°05.3	2.3	59.3
18	88°22.7	18°41.2	122°58.7	5.1	22°07.5	2.2	59.3
19	103°22.7	18°40.6	137°22.8	5.1	22°09.6	2.0	59.3
20	118°22.7	18°40.0	151°46.9	5.0	22°11.5	1.9	59.4
21	133°22.7	18°39.4	166°10.9	5.0	22°13.3	1.7	59.4
22	148°22.8	18°38.8	180°34.8	4.9	22°14.9	1.6	59.4
23	163°22.8	18°38.2	194°58.6	4.8	22°16.4	1.4	59.5
	SD.=15.8	d=-0.6			S.D.=16.0		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	00:28	23:25	–:–	–:–
68	–:–	–:–	01:52	22:17	–:–	–:–
66	–:–	–:–	02:29	21:41	–:–	–:–
64	–:–	01:10	02:54	21:16	22:56	–:–
62	–:–	01:57	03:14	20:57	22:12	–:–
60	–:–	02:26	03:31	20:41	21:44	–:–
58	01:04	02:48	03:44	20:27	21:23	23:03
56	01:47	03:06	03:56	20:16	21:06	22:23
54	02:14	03:20	04:06	20:06	20:51	21:57
52	02:34	03:33	04:15	19:57	20:39	21:37
50	02:51	03:44	04:23	19:49	20:28	21:21
45	03:22	04:06	04:40	19:32	20:06	20:50
40	03:46	04:24	04:54	19:18	19:49	20:27
35	04:04	04:38	05:06	19:06	19:35	20:09
30	04:19	04:50	05:16	18:56	19:22	19:54
20	04:42	05:10	05:34	18:39	19:03	19:31
10	05:00	05:27	05:49	18:24	18:46	19:12
0	05:16	05:41	06:03	18:10	18:32	18:57
-10	05:29	05:55	06:17	17:56	18:18	18:44
-20	05:42	06:08	06:32	17:42	18:05	18:32
-30	05:54	06:23	06:48	17:25	17:50	18:19
-35	06:00	06:31	06:58	17:15	17:42	18:13
-40	06:07	06:40	07:09	17:04	17:34	18:06
-45	06:14	06:50	07:22	16:52	17:23	17:59
-50	06:22	07:02	07:38	16:36	17:12	17:51
-52	06:26	07:07	07:45	16:29	17:06	17:48
-54	06:30	07:13	07:53	16:20	17:00	17:44
-56	06:34	07:20	08:02	16:11	16:54	17:40
-58	06:38	07:27	08:13	16:01	16:47	17:36
-60	06:43	07:35	08:25	15:49	16:39	17:31

Lat.	Moonrise			Moonset		
	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	21:47	–:–	–:–	18:08	–:–	–:–
68	22:28	22:21	–:–	17:28	19:29	–:–
66	22:57	23:08	23:38	17:01	18:43	20:15
64	23:18	23:39	–:–	16:40	18:13	19:36
62	23:36	–:–	00:02	16:23	17:50	19:09
60	23:50	–:–	00:20	16:09	17:32	18:48
58	–:–	00:03	00:36	15:57	17:17	18:30
56	–:–	00:14	00:49	15:47	17:04	18:16
54	–:–	00:23	01:01	15:38	16:52	18:03
52	00:02	00:32	01:11	15:30	16:42	17:52
50	00:08	00:39	01:20	15:22	16:34	17:42
45	00:20	00:56	01:39	15:07	16:15	17:21
40	00:31	01:09	01:55	14:54	15:60	17:05
35	00:40	01:21	02:08	14:43	15:47	16:51
30	00:48	01:31	02:20	14:34	15:36	16:38
20	01:02	01:48	02:40	14:18	15:16	16:17
10	01:15	02:04	02:58	14:04	14:60	15:59
0	01:26	02:18	03:14	13:51	14:44	15:42
-10	01:38	02:33	03:30	13:38	14:29	15:25
-20	01:51	02:48	03:48	13:24	14:12	15:07
-30	02:05	03:06	04:08	13:08	13:53	14:46
-35	02:14	03:16	04:20	12:58	13:42	14:33
-40	02:23	03:28	04:34	12:48	13:29	14:19
-45	02:35	03:43	04:51	12:36	13:15	14:03
-50	02:48	04:00	05:11	12:21	12:56	13:42
-52	02:55	04:08	05:20	12:14	12:48	13:32
-54	03:02	04:18	05:31	12:06	12:38	13:21
-56	03:10	04:28	05:43	11:58	12:27	13:09
-58	03:19	04:40	05:58	11:48	12:15	12:54
-60	03:29	04:54	06:15	11:37	12:01	12:37

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	06:32	06:32	12:06	07:38	20:04	25(26%)
28	06:32	06:31	12:06	08:31	20:59	26(17%)
29	06:31	06:30	12:06	09:27	21:57	27(10%)

July 30, 31 ,01 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	307°20.6	182°29.4	20°30.4	166°44.0	16°35.8	53°50.3	-22°07.4	20°16.1	-22°13.2
1	322°23.0	197°28.6	20°29.7	181°44.9	16°35.4	68°52.8	-22°07.4	35°18.8	-22°13.2
2	337°25.5	212°27.9	20°29.1	196°45.8	16°34.9	83°55.4	-22°07.4	50°21.4	-22°13.2
3	352°27.9	227°27.1	20°28.5	211°46.7	16°34.4	98°58.0	-22°07.4	65°24.1	-22°13.2
4	7°30.4	242°26.4	20°27.9	226°47.6	16°33.9	114°00.5	-22°07.4	80°26.7	-22°13.3
5	22°32.9	257°25.6	20°27.2	241°48.5	16°33.4	129°03.1	-22°07.4	95°29.3	-22°13.3
6	37°35.3	272°24.9	20°26.6	256°49.3	16°32.9	144°05.7	-22°07.4	110°32.0	-22°13.3
7	52°37.8	287°24.1	20°26.0	271°50.2	16°32.4	159°08.2	-22°07.4	125°34.6	-22°13.3
8	67°40.3	302°23.4	20°25.3	286°51.1	16°31.9	174°10.8	-22°07.4	140°37.3	-22°13.4
9	82°42.7	317°22.6	20°24.7	301°52.0	16°31.4	189°13.4	-22°07.4	155°39.9	-22°13.4
10	97°45.2	332°21.9	20°24.1	316°52.9	16°30.9	204°15.9	-22°07.4	170°42.5	-22°13.4
11	112°47.7	347°21.1	20°23.4	331°53.8	16°30.4	219°18.5	-22°07.3	185°45.2	-22°13.4
12	127°50.1	2°20.4	20°22.8	346°54.7	16°29.9	234°21.1	-22°07.3	200°47.8	-22°13.4
13	142°52.6	17°19.6	20°22.1	1°55.6	16°29.4	249°23.6	-22°07.3	215°50.5	-22°13.5
14	157°55.1	32°18.9	20°21.5	16°56.5	16°29.0	264°26.2	-22°07.3	230°53.1	-22°13.5
15	172°57.5	47°18.1	20°20.9	31°57.4	16°28.5	279°28.8	-22°07.3	245°55.7	-22°13.5
16	187°60.0	62°17.4	20°20.2	46°58.3	16°28.0	294°31.3	-22°07.3	260°58.4	-22°13.5
17	203°02.4	77°16.6	20°19.6	61°59.2	16°27.5	309°33.9	-22°07.3	276°01.0	-22°13.6
18	218°04.9	92°15.9	20°18.9	77°00.0	16°27.0	324°36.4	-22°07.3	291°03.7	-22°13.6
19	233°07.4	107°15.1	20°18.3	92°00.9	16°26.5	339°39.0	-22°07.3	306°06.3	-22°13.6
20	248°09.8	122°14.4	20°17.6	107°01.8	16°26.0	354°41.6	-22°07.3	321°08.9	-22°13.6
21	263°12.3	137°13.6	20°17.0	122°02.7	16°25.5	9°44.1	-22°07.3	336°11.6	-22°13.7
22	278°14.8	152°12.9	20°16.4	137°03.6	16°25.0	24°46.7	-22°07.3	351°14.2	-22°13.7
23	293°17.2	167°12.1	20°15.7	152°04.5	16°24.5	39°49.3	-22°07.3	6°16.9	-22°13.7
Mer.pass.:3:30:		v-0.8 d-0.6 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	308°19.7	182°11.4	20°15.1	167°05.4	16°24.0	54°51.8	-22°07.3	21°19.5	-22°13.7
1	323°22.2	197°10.6	20°14.4	182°06.3	16°23.5	69°54.4	-22°07.3	36°22.1	-22°13.7
2	338°24.6	212°09.9	20°13.8	197°07.2	16°23.0	84°56.9	-22°07.3	51°24.8	-22°13.8
3	353°27.1	227°09.1	20°13.1	212°08.1	16°22.5	99°59.5	-22°07.3	66°27.4	-22°13.8
4	8°29.5	242°08.4	20°12.4	227°09.0	16°22.0	115°02.1	-22°07.3	81°30.1	-22°13.8
5	23°32.0	257°07.6	20°11.8	242°09.9	16°21.5	130°04.6	-22°07.3	96°32.7	-22°13.8
6	38°34.5	272°06.9	20°11.1	257°10.8	16°21.0	145°07.2	-22°07.3	111°35.3	-22°13.9
7	53°36.9	287°06.2	20°10.5	272°11.7	16°20.5	160°09.7	-22°07.3	126°38.0	-22°13.9
8	68°39.4	302°05.4	20°09.8	287°12.6	16°20.0	175°12.3	-22°07.3	141°40.6	-22°13.9
9	83°41.9	317°04.7	20°09.2	302°13.4	16°19.5	190°14.8	-22°07.3	156°43.3	-22°13.9
10	98°44.3	332°03.9	20°08.5	317°14.3	16°19.0	205°17.4	-22°07.3	171°45.9	-22°14.0
11	113°46.8	347°03.2	20°07.8	332°15.2	16°18.5	220°20.0	-22°07.3	186°48.5	-22°14.0
12	128°49.3	2°02.5	20°07.2	347°16.1	16°18.1	235°22.5	-22°07.3	201°51.2	-22°14.0
13	143°51.7	17°01.7	20°06.5	2°17.0	16°17.6	250°25.1	-22°07.3	216°53.8	-22°14.0
14	158°54.2	32°01.0	20°05.9	17°17.9	16°17.1	265°27.6	-22°07.3	231°56.4	-22°14.0
15	173°56.7	47°00.2	20°05.2	32°18.8	16°16.6	280°30.2	-22°07.3	246°59.1	-22°14.1
16	188°59.1	61°59.5	20°04.5	47°19.7	16°16.1	295°32.7	-22°07.3	262°01.7	-22°14.1
17	204°01.6	76°58.8	20°03.9	62°20.6	16°15.6	310°35.3	-22°07.3	277°04.4	-22°14.1
18	219°04.0	91°58.0	20°03.2	77°21.5	16°15.1	325°37.9	-22°07.3	292°07.0	-22°14.1
19	234°06.5	106°57.3	20°02.5	92°22.4	16°14.6	340°40.4	-22°07.3	307°09.6	-22°14.2
20	249°09.0	121°56.5	20°01.8	107°23.3	16°14.1	355°43.0	-22°07.3	322°12.3	-22°14.2
21	264°11.4	136°55.8	20°01.2	122°24.2	16°13.6	10°45.5	-22°07.3	337°14.9	-22°14.2
22	279°13.9	151°55.1	20°00.5	137°25.1	16°13.1	25°48.1	-22°07.3	352°17.6	-22°14.2
23	294°16.4	166°54.3	19°59.8	152°26.0	16°12.6	40°50.6	-22°07.3	7°20.2	-22°14.3
Mer.pass.:3:26:		v-0.7 d-0.7 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	309°18.8	181°53.6	19°59.2	167°26.9	16°12.1	55°53.2	-22°07.3	22°22.8	-22°14.3
1	324°21.3	196°52.9	19°58.5	182°27.8	16°11.6	70°55.7	-22°07.3	37°25.5	-22°14.3
2	339°23.8	211°52.1	19°57.8	197°28.7	16°11.1	85°58.3	-22°07.3	52°28.1	-22°14.3
3	354°26.2	226°51.4	19°57.1	212°29.6	16°10.6	101°00.8	-22°07.3	67°30.7	-22°14.3
4	9°28.7	241°50.7	19°56.5	227°30.5	16°10.1	116°03.4	-22°07.3	82°33.4	-22°14.4
5	24°31.2	256°49.9	19°55.8	242°31.4	16°09.6	131°05.9	-22°07.3	97°36.0	-22°14.4
6	39°33.6	271°49.2	19°55.1	257°32.3	16°09.1	146°08.5	-22°07.3	112°38.6	-22°14.4
7	54°36.1	286°48.5	19°54.4	272°33.2	16°08.6	161°11.0	-22°07.3	127°41.3	-22°14.4
8	69°38.5	301°47.7	19°53.7	287°34.1	16°08.1	176°13.6	-22°07.3	142°43.9	-22°14.5
9	84°41.0	316°47.0	19°53.0	302°35.0	16°07.6	191°16.1	-22°07.3	157°46.6	-22°14.5
10	99°43.5	331°46.3	19°52.4	317°35.8	16°07.1	206°18.7	-22°07.3	172°49.2	-22°14.5
11	114°45.9	346°45.5	19°51.7	332°36.7	16°06.6	221°21.2	-22°07.3	187°51.8	-22°14.5
12	129°48.4	1°44.8	19°51.0	347°37.6	16°06.1	236°23.8	-22°07.3	202°54.5	-22°14.6
13	144°50.9	16°44.1	19°50.3	2°38.5	16°05.6	251°26.3	-22°07.3	217°57.1	-22°14.6
14	159°53.3	31°43.3	19°49.6	17°39.4	16°05.0	266°28.9	-22°07.3	232°59.7	-22°14.6
15	174°55.8	46°42.6	19°48.9	32°40.3	16°04.5	281°31.4	-22°07.3	248°02.4	-22°14.6
16	189°58.3	61°41.9	19°48.2	47°41.2	16°04.0	296°34.0	-22°07.3	263°05.0	-22°14.6
17	205°00.7	76°41.2	19°47.5	62°42.1	16°03.5	311°36.5	-22°07.3	278°07.6	-22°14.7
18	220°03.2	91°40.4	19°46.9	77°43.0	16°03.0	326°39.1	-22°07.3	293°10.3	-22°14.7
19	235°05.7	106°39.7	19°46.2	92°43.9	16°02.5	341°41.6	-22°07.3	308°12.9	-22°14.7
20	250°08.1	121°39.0	19°45.5	107°44.8	16°02.0	356°44.2	-22°07.3	323°15.6	-22°14.7
21	265°10.6	136°38.2	19°44.8	122°45.7	16°01.5	11°46.7	-22°07.3	338°18.2	-22°14.8
22	280°13.0	151°37.5	19°44.1	137°46.6	16°01.0	26°49.3	-22°07.3	353°20.8	-22°14.8
23	295°15.5	166°36.8	19°43.4	152°47.5	16°00.5	41°51.8	-22°07.3	8°23.5	-22°14.8
Mer.pass.:3:22:		v-0.7 d-0.7 m-3.8		v0.9 d-0.5 m1.8		v2.6 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Stars

	SHA	**Dec**
Alpheratz	357°39.0	29°11.8
Ankaa	353°11.3	-42°11.8
Schedar	349°35.5	56°38.4
Diphda	348°51.4	-17°52.7
Achernar	335°23.5	-57°08.1
Hamal	327°56.0	23°33.1
Polaris	316°00.3	89°20.4
Akamar	315°15.2	-40°13.5
Menkar	314°10.7	4°09.9
Mirfak	308°34.5	49°55.5
Aldebaran	290°44.8	16°32.8
Rigel	281°08.2	-8°10.8
Capella	280°28.6	46°00.8
Bellatrix	278°27.7	6°22.0
Elnath	278°07.6	28°37.3
Alnilam	275°42.4	-1°11.4
Betelgeuse	270°57.0	7°24.6
Canopus	263°54.8	-52°42.3
Sirius	258°30.3	-16°44.4
Adara	255°09.6	-28°59.9
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.3
Suhail	222°49.8	-43°30.7
Miaplacidus	221°39.8	-69°47.9
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°38.9
Acrux	173°05.0	-63°12.6
Gacrux	171°56.5	-57°13.4
Alioth	166°17.2	55°51.6
Spica	158°26.9	-11°15.6
Alcaid	152°55.6	49°13.4
Hadar	148°42.0	-60°28.1
Menkent	148°02.7	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.0	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°19.9	74°05.0
Alphecca	126°07.3	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.6	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.0
Etamin	90°43.8	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.0	-56°40.2
Deneb	49°28.2	45°21.1
Enif	33°42.7	9°57.9
Alnair	27°38.0	-46°51.8
Fomalhaut	15°19.1	-29°31.0
Scheat	13°49.1	28°11.2
Markab	13°33.9	15°18.6

2019/7/3	**SHA**	**Mer.pass**
Venus	235°08.8	11:51
Mars	219°23.4	12:52
Jupiter	106°29.7	20:21
Saturn	72°55.6	22:35

2019/7/3	**SHA**	**Mer.pass**
Venus	233°51.7	11:52
Mars	218°45.7	12:51
Jupiter	106°32.1	20:17
Saturn	72°59.8	22:31

2019/8/1	**SHA**	**Mer.pass**
Venus	232°34.8	11:53
Mars	218°08.0	12:49
Jupiter	106°34.3	20:13
Saturn	73°04.0	22:27

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°22.8	18°37.6	209°22.4	4.8	22°17.8	1.3	59.5
1	193°22.8	18°37.0	223°46.2	4.7	22°18.9	1.1	59.5
2	208°22.8	18°36.4	238°09.9	4.7	22°20.0	1.0	59.6
3	223°22.9	18°35.8	252°33.5	4.6	22°20.8	0.8	59.6
4	238°22.9	18°35.2	266°57.1	4.5	22°21.6	0.6	59.6
5	253°22.9	18°34.6	281°20.6	4.5	22°22.1	0.5	59.7
6	268°22.9	18°34.0	295°44.1	4.4	22°22.6	0.3	59.7
7	283°23.0	18°33.4	310°07.5	4.4	22°22.8	0.2	59.7
8	298°23.0	18°32.8	324°30.9	4.4	22°22.9	0.0	59.8
9	313°23.0	18°32.2	338°54.2	4.3	22°22.9	-0.1	59.8
10	328°23.0	18°31.6	353°17.5	4.3	22°22.7	-0.3	59.8
11	343°23.1	18°31.0	7°40.7	4.2	22°22.3	-0.4	59.9
12	358°23.1	18°30.4	22°03.9	4.2	22°21.8	-0.6	59.9
13	13°23.1	18°29.8	36°27.1	4.2	22°21.1	-0.8	59.9
14	28°23.1	18°29.2	50°50.3	4.1	22°20.2	-0.9	60.0
15	43°23.2	18°28.6	65°13.4	4.1	22°19.2	-1.1	60.0
16	58°23.2	18°28.0	79°36.4	4.1	22°18.1	-1.2	60.0
17	73°23.2	18°27.4	93°59.5	4.0	22°16.7	-1.4	60.0
18	88°23.2	18°26.8	108°22.5	4.0	22°15.3	-1.6	60.1
19	103°23.3	18°26.1	122°45.5	4.0	22°13.6	-1.7	60.1
20	118°23.3	18°25.5	137°08.5	4.0	22°11.8	-1.9	60.1
21	133°23.3	18°24.9	151°31.4	3.9	22°09.8	-2.0	60.2
22	148°23.3	18°24.3	165°54.4	3.9	22°07.7	-2.2	60.2
23	163°23.4	18°23.7	180°17.3	3.9	22°05.4	-2.4	60.2
	SD.=15.8	d=-0.6			S.D.=16.2		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°23.4	18°23.1	194°40.2	3.9	22°03.0	-2.5	60.2
1	193°23.4	18°22.5	209°03.1	3.9	22°00.4	-2.7	60.3
2	208°23.4	18°21.9	223°25.9	3.9	21°57.6	-2.9	60.3
3	223°23.5	18°21.3	237°48.8	3.9	21°54.7	-3.0	60.3
4	238°23.5	18°20.7	252°11.7	3.9	21°51.6	-3.2	60.3
5	253°23.5	18°20.0	266°34.5	3.9	21°48.3	-3.3	60.4
6	268°23.6	18°19.4	280°57.4	3.9	21°44.9	-3.5	60.4
7	283°23.6	18°18.8	295°20.2	3.9	21°41.3	-3.7	60.4
8	298°23.6	18°18.2	309°43.1	3.9	21°37.6	-3.8	60.4
9	313°23.6	18°17.6	324°06.0	3.9	21°33.7	-4.0	60.5
10	328°23.7	18°17.0	338°28.8	3.9	21°29.7	-4.1	60.5
11	343°23.7	18°16.4	352°51.7	3.9	21°25.5	-4.3	60.5
12	358°23.7	18°15.7	7°14.6	3.9	21°21.1	-4.4	60.5
13	13°23.8	18°15.1	21°37.4	3.9	21°16.6	-4.6	60.6
14	28°23.8	18°14.5	36°00.3	3.9	21°11.9	-4.8	60.6
15	43°23.8	18°13.9	50°23.3	3.9	21°07.0	-4.9	60.6
16	58°23.9	18°13.3	64°46.2	3.9	21°02.0	-5.1	60.6
17	73°23.9	18°12.6	79°09.1	4.0	20°56.9	-5.2	60.6
18	88°23.9	18°12.0	93°32.1	4.0	20°51.6	-5.4	60.7
19	103°24.0	18°11.4	107°55.1	4.0	20°46.1	-5.5	60.7
20	118°24.0	18°10.8	122°18.1	4.0	20°40.5	-5.7	60.7
21	133°24.0	18°10.2	136°41.2	4.1	20°34.7	-5.8	60.7
22	148°24.1	18°09.5	151°04.2	4.1	20°28.8	-6.0	60.7
23	163°24.1	18°08.9	165°27.3	4.1	20°22.7	-6.1	60.7
	SD.=15.8	d=-0.6			S.D.=16.4		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°24.1	18°08.3	179°50.5	4.1	20°16.5	-6.3	60.8
1	193°24.2	18°07.7	194°13.6	4.2	20°10.1	-6.4	60.8
2	208°24.2	18°07.1	208°36.8	4.2	20°03.6	-6.6	60.8
3	223°24.2	18°06.4	223°00.1	4.2	19°56.9	-6.7	60.8
4	238°24.3	18°05.8	237°23.3	4.3	19°50.1	-6.9	60.8
5	253°24.3	18°05.2	251°46.6	4.3	19°43.2	-7.0	60.8
6	268°24.3	18°04.6	266°10.0	4.4	19°36.1	-7.2	60.8
7	283°24.4	18°03.9	280°33.4	4.4	19°28.8	-7.3	60.9
8	298°24.4	18°03.3	294°56.8	4.5	19°21.4	-7.5	60.9
9	313°24.4	18°02.7	309°20.3	4.5	19°13.9	-7.6	60.9
10	328°24.5	18°02.0	323°43.8	4.5	19°06.2	-7.7	60.9
11	343°24.5	18°01.4	338°07.4	4.6	18°58.4	-7.9	60.9
12	358°24.6	18°00.8	352°31.0	4.6	18°50.4	-8.0	60.9
13	13°24.6	18°00.2	6°54.6	4.7	18°42.3	-8.2	60.9
14	28°24.6	17°59.5	21°18.4	4.7	18°34.1	-8.3	60.9
15	43°24.7	17°58.9	35°42.1	4.8	18°25.8	-8.4	60.9
16	58°24.7	17°58.3	50°06.0	4.8	18°17.3	-8.6	60.9
17	73°24.7	17°57.6	64°29.8	4.9	18°08.6	-8.7	61.0
18	88°24.8	17°57.0	78°53.8	5.0	17°59.9	-8.8	61.0
19	103°24.8	17°56.4	93°17.7	5.0	17°51.0	-8.9	61.0
20	118°24.9	17°55.7	107°41.8	5.1	17°42.0	-9.1	61.0
21	133°24.9	17°55.1	122°05.9	5.1	17°32.9	-9.2	61.0
22	148°24.9	17°54.5	136°30.1	5.2	17°23.6	-9.3	61.0
23	163°25.0	17°53.8	150°54.3	5.3	17°14.2	-9.4	61.0
	SD.=15.8	d=-0.6			S.D.=16.6		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	01:14	22:50	–:–	–:–
68	–:–	–:–	02:08	22:00	–:–	–:–
66	–:–	–:–	02:40	21:29	–:–	–:–
64	–:–	01:31	03:04	21:07	22:36	–:–
62	–:–	02:10	03:22	20:48	21:60	–:–
60	–:–	02:36	03:38	20:34	21:34	–:–
58	01:23	02:56	03:50	20:21	21:15	22:45
56	01:58	03:12	04:01	20:10	20:59	22:12
54	02:22	03:26	04:11	20:01	20:45	21:48
52	02:41	03:38	04:20	19:52	20:34	21:30
50	02:57	03:48	04:27	19:44	20:23	21:14
45	03:27	04:10	04:44	19:28	20:02	20:45
40	03:49	04:27	04:57	19:15	19:46	20:23
35	04:07	04:40	05:08	19:04	19:32	20:06
30	04:21	04:52	05:18	18:54	19:20	19:51
20	04:44	05:11	05:35	18:38	19:01	19:29
10	05:01	05:27	05:49	18:23	18:45	19:11
0	05:16	05:41	06:03	18:10	18:32	18:57
-10	05:29	05:54	06:16	17:57	18:19	18:44
-20	05:41	06:07	06:30	17:43	18:06	18:32
-30	05:52	06:21	06:46	17:27	17:52	18:21
-35	05:58	06:29	06:56	17:18	17:44	18:15
-40	06:05	06:37	07:06	17:07	17:36	18:09
-45	06:11	06:47	07:19	16:55	17:26	18:02
-50	06:19	06:58	07:33	16:40	17:15	17:55
-52	06:22	07:03	07:40	16:33	17:10	17:51
-54	06:26	07:09	07:48	16:25	17:05	17:48
-56	06:29	07:15	07:57	16:17	16:59	17:44
-58	06:33	07:22	08:07	16:07	16:52	17:40
-60	06:38	07:29	08:18	15:56	16:44	17:36

Lat.	Moonrise Tue	Moonrise Wed	Moonrise Thu	Moonset Tue	Moonset Wed	Moonset Thu
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	23:21	–:–	01:50	22:41	22:21	22:14
66	–:–	00:46	02:30	21:15	21:40	21:50
64	00:17	01:24	02:58	20:37	21:12	21:31
62	00:44	01:51	03:19	20:10	20:51	21:16
60	01:06	02:12	03:36	19:49	20:33	21:03
58	01:23	02:29	03:51	19:32	20:18	20:51
56	01:38	02:43	04:03	19:17	20:05	20:42
54	01:51	02:55	04:14	19:05	19:54	20:33
52	02:02	03:06	04:23	18:54	19:45	20:25
50	02:12	03:16	04:31	18:44	19:36	20:18
45	02:33	03:37	04:49	18:23	19:17	20:03
40	02:50	03:53	05:04	18:06	19:02	19:50
35	03:04	04:07	05:16	17:52	18:49	19:39
30	03:16	04:19	05:27	17:40	18:37	19:30
20	03:38	04:40	05:46	17:18	18:18	19:13
10	03:56	04:58	06:02	16:60	18:01	18:59
0	04:13	05:15	06:17	16:43	17:45	18:46
-10	04:31	05:32	06:32	16:25	17:28	18:32
-20	04:49	05:50	06:48	16:07	17:11	18:17
-30	05:11	06:11	07:06	15:45	16:51	18:00
-35	05:23	06:23	07:17	15:33	16:39	17:50
-40	05:38	06:37	07:29	15:18	16:26	17:39
-45	05:55	06:53	07:43	15:01	16:10	17:26
-50	06:16	07:14	08:00	14:40	15:50	17:09
-52	06:27	07:23	08:09	14:30	15:41	17:02
-54	06:38	07:34	08:18	14:18	15:30	16:53
-56	06:51	07:46	08:28	14:05	15:18	16:43
-58	07:06	08:00	08:40	13:50	15:04	16:32
-60	07:24	08:17	08:53	13:32	14:48	16:19

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
30	06:29	06:28	12:06	10:27	22:58	28(4%)
31	06:26	06:25	12:06	11:29	00:00	29(1%)
1	06:23	06:22	12:06	12:31	00:00	0(0%)

August 02, 03 ,04 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	310°18.0	181°36.1	19°42.7	167°48.4	16°00.0	56°54.3	-22°07.3	23°26.1	-22°14.8
1	325°20.4	196°35.3	19°42.0	182°49.3	15°59.5	71°56.9	-22°07.3	38°28.7	-22°14.8
2	340°22.9	211°34.6	19°41.3	197°50.2	15°59.0	86°59.4	-22°07.3	53°31.4	-22°14.9
3	355°25.4	226°33.9	19°40.6	212°51.1	15°58.5	102°02.0	-22°07.3	68°34.0	-22°14.9
4	10°27.8	241°33.2	19°39.9	227°52.0	15°58.0	117°04.5	-22°07.3	83°36.6	-22°14.9
5	25°30.3	256°32.4	19°39.2	242°52.9	15°57.5	132°07.1	-22°07.3	98°39.3	-22°14.9
6	40°32.8	271°31.7	19°38.5	257°53.8	15°57.0	147°09.6	-22°07.3	113°41.9	-22°15.0
7	55°35.2	286°31.0	19°37.8	272°54.7	15°56.5	162°12.1	-22°07.3	128°44.5	-22°15.0
8	70°37.7	301°30.3	19°37.1	287°55.6	15°56.0	177°14.7	-22°07.3	143°47.2	-22°15.0
9	85°40.2	316°29.6	19°36.4	302°56.5	15°55.5	192°17.2	-22°07.3	158°49.8	-22°15.0
10	100°42.6	331°28.8	19°35.7	317°57.4	15°55.0	207°19.8	-22°07.3	173°52.4	-22°15.0
11	115°45.1	346°28.1	19°34.9	332°58.3	15°54.5	222°22.3	-22°07.3	188°55.1	-22°15.1
12	130°47.5	1°27.4	19°34.2	347°59.2	15°54.0	237°24.9	-22°07.3	203°57.7	-22°15.1
13	145°50.0	16°26.7	19°33.5	3°00.1	15°53.4	252°27.4	-22°07.3	219°00.3	-22°15.1
14	160°52.5	31°26.0	19°32.8	18°01.0	15°52.9	267°29.9	-22°07.3	234°03.0	-22°15.1
15	175°54.9	46°25.2	19°32.1	33°01.9	15°52.4	282°32.5	-22°07.3	249°05.6	-22°15.2
16	190°57.4	61°24.5	19°31.4	48°02.8	15°51.9	297°35.0	-22°07.3	264°08.2	-22°15.2
17	205°59.9	76°23.8	19°30.7	63°03.7	15°51.4	312°37.6	-22°07.3	279°10.9	-22°15.2
18	221°02.3	91°23.1	19°30.0	78°04.6	15°50.9	327°40.1	-22°07.3	294°13.5	-22°15.2
19	236°04.8	106°22.4	19°29.2	93°05.5	15°50.4	342°42.6	-22°07.3	309°16.1	-22°15.2
20	251°07.3	121°21.7	19°28.5	108°06.4	15°49.9	357°45.2	-22°07.3	324°18.8	-22°15.3
21	266°09.7	136°20.9	19°27.8	123°07.3	15°49.4	12°47.7	-22°07.3	339°21.4	-22°15.3
22	281°12.2	151°20.2	19°27.1	138°08.2	15°48.9	27°50.2	-22°07.3	354°24.0	-22°15.3
23	296°14.6	166°19.5	19°26.4	153°09.1	15°48.4	42°52.8	-22°07.3	9°26.7	-22°15.3
Mer.pass.:3:18:		v-0.7 d-0.7 m-3.8		v0.9 d-0.5 m1.8		v2.5 d0.0 m-2.3		v2.6 d-0.0 m0.1	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	311°17.1	181°18.8	19°25.7	168°10.0	15°47.9	57°55.3	-22°07.3	24°29.3	-22°15.4
1	326°19.6	196°18.1	19°24.9	183°11.0	15°47.4	72°57.8	-22°07.3	39°31.9	-22°15.4
2	341°22.0	211°17.4	19°24.2	198°11.9	15°46.8	88°00.4	-22°07.3	54°34.6	-22°15.4
3	356°24.5	226°16.7	19°23.5	213°12.8	15°46.3	103°02.9	-22°07.3	69°37.2	-22°15.4
4	11°27.0	241°15.9	19°22.8	228°13.7	15°45.8	118°05.5	-22°07.3	84°39.8	-22°15.5
5	26°29.4	256°15.2	19°22.0	243°14.6	15°45.3	133°08.0	-22°07.3	99°42.5	-22°15.5
6	41°31.9	271°14.5	19°21.3	258°15.5	15°44.8	148°10.5	-22°07.3	114°45.1	-22°15.5
7	56°34.4	286°13.8	19°20.6	273°16.4	15°44.3	163°13.1	-22°07.3	129°47.7	-22°15.5
8	71°36.8	301°13.1	19°19.9	288°17.3	15°43.8	178°15.6	-22°07.3	144°50.4	-22°15.5
9	86°39.3	316°12.4	19°19.1	303°18.2	15°43.3	193°18.1	-22°07.3	159°53.0	-22°15.6
10	101°41.8	331°11.7	19°18.4	318°19.1	15°42.8	208°20.7	-22°07.3	174°55.6	-22°15.6
11	116°44.2	346°11.0	19°17.7	333°20.0	15°42.3	223°23.2	-22°07.3	189°58.3	-22°15.6
12	131°46.7	1°10.3	19°16.9	348°20.9	15°41.7	238°25.7	-22°07.3	205°00.9	-22°15.6
13	146°49.1	16°09.5	19°16.2	3°21.8	15°41.2	253°28.3	-22°07.3	220°03.5	-22°15.7
14	161°51.6	31°08.8	19°15.5	18°22.7	15°40.7	268°30.8	-22°07.3	235°06.2	-22°15.7
15	176°54.1	46°08.1	19°14.7	33°23.6	15°40.2	283°33.3	-22°07.3	250°08.8	-22°15.7
16	191°56.5	61°07.4	19°14.0	48°24.5	15°39.7	298°35.9	-22°07.3	265°11.4	-22°15.7
17	206°59.0	76°06.7	19°13.3	63°25.4	15°39.2	313°38.4	-22°07.3	280°14.1	-22°15.7
18	222°01.5	91°06.0	19°12.5	78°26.3	15°38.7	328°40.9	-22°07.3	295°16.7	-22°15.8
19	237°03.9	106°05.3	19°11.8	93°27.2	15°38.2	343°43.4	-22°07.3	310°19.3	-22°15.8
20	252°06.4	121°04.6	19°11.0	108°28.1	15°37.7	358°46.0	-22°07.3	325°22.0	-22°15.8
21	267°08.9	136°03.9	19°10.3	123°29.0	15°37.1	13°48.5	-22°07.3	340°24.6	-22°15.8
22	282°11.3	151°03.2	19°09.6	138°29.9	15°36.6	28°51.0	-22°07.3	355°27.2	-22°15.8
23	297°13.8	166°02.5	19°08.8	153°30.8	15°36.1	43°53.6	-22°07.3	10°29.8	-22°15.9
Mer.pass.:3:14:		v-0.7 d-0.7 m-3.8		v0.9 d-0.5 m1.8		v2.5 d-0.0 m-2.3		v2.6 d-0.0 m0.2	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	312°16.2	181°01.8	19°08.1	168°31.7	15°35.6	58°56.1	-22°07.3	25°32.5	-22°15.9
1	327°18.7	196°01.1	19°07.3	183°32.7	15°35.1	73°58.6	-22°07.3	40°35.1	-22°15.9
2	342°21.2	211°00.4	19°06.6	198°33.6	15°34.6	89°01.1	-22°07.3	55°37.7	-22°15.9
3	357°23.6	225°59.7	19°05.8	213°34.5	15°34.1	104°03.7	-22°07.3	70°40.4	-22°16.0
4	12°26.1	240°59.0	19°05.1	228°35.4	15°33.6	119°06.2	-22°07.3	85°43.0	-22°16.0
5	27°28.6	255°58.3	19°04.3	243°36.3	15°33.0	134°08.7	-22°07.3	100°45.6	-22°16.0
6	42°31.0	270°57.6	19°03.6	258°37.2	15°32.5	149°11.2	-22°07.3	115°48.3	-22°16.0
7	57°33.5	285°56.9	19°02.8	273°38.1	15°32.0	164°13.8	-22°07.3	130°50.9	-22°16.0
8	72°36.0	300°56.2	19°02.1	288°39.0	15°31.5	179°16.3	-22°07.3	145°53.5	-22°16.1
9	87°38.4	315°55.5	19°01.3	303°39.9	15°31.0	194°18.8	-22°07.3	160°56.1	-22°16.1
10	102°40.9	330°54.8	19°00.6	318°40.8	15°30.5	209°21.3	-22°07.3	175°58.8	-22°16.1
11	117°43.4	345°54.1	18°59.8	333°41.7	15°30.0	224°23.9	-22°07.3	191°01.4	-22°16.1
12	132°45.8	0°53.4	18°59.1	348°42.6	15°29.4	239°26.4	-22°07.3	206°04.0	-22°16.2
13	147°48.3	15°52.7	18°58.3	3°43.5	15°28.9	254°28.9	-22°07.3	221°06.7	-22°16.2
14	162°50.7	30°52.0	18°57.6	18°44.4	15°28.4	269°31.4	-22°07.3	236°09.3	-22°16.2
15	177°53.2	45°51.3	18°56.8	33°45.3	15°27.9	284°34.0	-22°07.3	251°11.9	-22°16.2
16	192°55.7	60°50.6	18°56.0	48°46.2	15°27.4	299°36.5	-22°07.3	266°14.6	-22°16.2
17	207°58.1	75°49.9	18°55.3	63°47.2	15°26.9	314°39.0	-22°07.3	281°17.2	-22°16.3
18	223°00.6	90°49.2	18°54.5	78°48.1	15°26.3	329°41.5	-22°07.3	296°19.8	-22°16.3
19	238°03.1	105°48.5	18°53.8	93°49.0	15°25.8	344°44.1	-22°07.3	311°22.4	-22°16.3
20	253°05.5	120°47.8	18°53.0	108°49.9	15°25.3	359°46.6	-22°07.3	326°25.1	-22°16.3
21	268°08.0	135°47.1	18°52.2	123°50.8	15°24.8	14°49.1	-22°07.3	341°27.7	-22°16.4
22	283°10.5	150°46.4	18°51.5	138°51.7	15°24.3	29°51.6	-22°07.3	356°30.3	-22°16.4
23	298°12.9	165°45.7	18°50.7	153°52.6	15°23.8	44°54.1	-22°07.3	11°33.0	-22°16.4
Mer.pass.:3:10:		v-0.7 d-0.7 m-3.8		v0.9 d-0.5 m1.8		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Stars	SHA	Dec
Alpheratz	357°38.9	29°11.8
Ankaa	353°11.3	-42°11.8
Schedar	349°35.5	56°38.4
Diphda	348°51.4	-17°52.7
Achernar	335°23.5	-57°08.1
Hamal	327°56.0	23°33.1
Polaris	315°58.9	89°20.4
Akamar	315°15.2	-40°13.4
Menkar	314°10.7	4°09.9
Mirfak	308°34.4	49°55.5
Aldebaran	290°44.7	16°32.8
Rigel	281°08.2	-8°10.8
Capella	280°28.6	46°00.8
Bellatrix	278°27.7	6°22.0
Elnath	278°07.6	28°37.3
Alnilam	275°42.3	-1°11.4
Betelgeuse	270°57.0	7°24.6
Canopus	263°54.8	-52°42.3
Sirius	258°30.2	-16°44.4
Adara	255°09.6	-28°59.9
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.3
Suhail	222°49.8	-43°30.7
Miaplacidus	221°39.8	-69°47.9
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.1	-17°38.9
Acrux	173°05.0	-63°12.5
Gacrux	171°56.5	-57°13.4
Alioth	166°17.3	55°51.6
Spica	158°26.9	-11°15.6
Alcaid	152°55.7	49°13.4
Hadar	148°42.0	-60°28.1
Menkent	148°02.7	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.0	-60°55.0
Zubenelg.	137°00.7	-16°07.2
Kochab	137°20.0	74°05.0
Alphecca	126°07.4	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.6	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.1
Etamin	90°43.8	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.0	-56°40.2
Deneb	49°28.2	45°21.1
Enif	33°42.7	9°57.9
Alnair	27°38.0	-46°51.8
Fomalhaut	15°19.1	-29°31.0
Scheat	13°49.0	28°11.2
Markab	13°33.9	15°18.6

2019/8/2	SHA	Mer.pass
Venus	231°18.1	11:54
Mars	217°30.5	12:48
Jupiter	106°36.4	20:09
Saturn	73°08.1	22:22

2019/8/3	SHA	Mer.pass
Venus	230°01.7	11:55
Mars	216°52.9	12:47
Jupiter	106°38.2	20:05
Saturn	73°12.2	22:18

2019/8/4	SHA	Mer.pass
Venus	228°45.5	11:56
Mars	216°15.5	12:45
Jupiter	106°39.8	20:01
Saturn	73°16.2	22:14

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°25.0	17°53.2	165°18.6	5.3	17°04.7	-9.6	61.0
1	193°25.1	17°52.6	179°42.9	5.4	16°55.1	-9.7	61.0
2	208°25.1	17°51.9	194°07.3	5.4	16°45.4	-9.8	61.0
3	223°25.1	17°51.3	208°31.8	5.5	16°35.5	-9.9	61.0
4	238°25.2	17°50.7	222°56.3	5.6	16°25.5	-10.0	61.0
5	253°25.2	17°50.0	237°20.9	5.6	16°15.4	-10.1	61.0
6	268°25.3	17°49.4	251°45.6	5.7	16°05.2	-10.3	61.0
7	283°25.3	17°48.7	266°10.3	5.8	15°54.9	-10.4	61.0
8	298°25.3	17°48.1	280°35.1	5.8	15°44.5	-10.5	61.0
9	313°25.4	17°47.5	294°60.0	5.9	15°34.0	-10.6	61.0
10	328°25.4	17°46.8	309°24.9	6.0	15°23.3	-10.7	61.0
11	343°25.5	17°46.2	323°49.9	6.0	15°12.6	-10.8	61.0
12	358°25.5	17°45.5	338°15.0	6.1	15°01.8	-10.9	61.0
13	13°25.6	17°44.9	352°40.1	6.2	14°50.8	-11.0	61.0
14	28°25.6	17°44.3	7°05.3	6.2	14°39.8	-11.1	61.0
15	43°25.6	17°43.6	21°30.6	6.3	14°28.6	-11.2	61.0
16	58°25.7	17°43.0	35°55.9	6.4	14°17.4	-11.3	61.0
17	73°25.7	17°42.3	50°21.3	6.4	14°06.1	-11.4	61.0
18	88°25.8	17°41.7	64°46.8	6.5	13°54.7	-11.5	61.0
19	103°25.8	17°41.0	79°12.3	6.6	13°43.2	-11.6	61.0
20	118°25.9	17°40.4	93°37.9	6.7	13°31.6	-11.6	61.0
21	133°25.9	17°39.8	108°03.6	6.7	13°19.9	-11.7	61.0
22	148°26.0	17°39.1	122°29.4	6.8	13°08.1	-11.8	61.0
23	163°26.0	17°38.5	136°55.2	6.9	12°56.3	-11.9	60.9
	SD.=15.8	d=-0.6			S.D.=16.6		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°26.1	17°37.8	151°21.1	6.9	12°44.3	-12.0	60.9
1	193°26.1	17°37.2	165°47.1	7.0	12°32.3	-12.1	60.9
2	208°26.2	17°36.5	180°13.1	7.1	12°20.2	-12.1	60.9
3	223°26.2	17°35.9	194°39.2	7.1	12°08.1	-12.2	60.9
4	238°26.2	17°35.2	209°05.4	7.2	11°55.8	-12.3	60.9
5	253°26.3	17°34.6	223°31.6	7.3	11°43.5	-12.3	60.9
6	268°26.3	17°33.9	237°58.0	7.3	11°31.1	-12.4	60.9
7	283°26.4	17°33.3	252°24.3	7.4	11°18.7	-12.5	60.9
8	298°26.4	17°32.6	266°50.8	7.5	11°06.2	-12.6	60.9
9	313°26.5	17°32.0	281°17.3	7.6	10°53.6	-12.6	60.8
10	328°26.5	17°31.3	295°43.9	7.6	10°40.9	-12.7	60.8
11	343°26.6	17°30.7	310°10.5	7.7	10°28.2	-12.7	60.8
12	358°26.6	17°30.0	324°37.3	7.8	10°15.5	-12.8	60.8
13	13°26.7	17°29.4	339°04.1	7.8	10°02.6	-12.9	60.8
14	28°26.7	17°28.7	353°30.9	7.9	9°49.7	-12.9	60.8
15	43°26.8	17°28.0	7°57.8	8.0	9°36.8	-13.0	60.8
16	58°26.8	17°27.4	22°24.8	8.0	9°23.8	-13.0	60.7
17	73°26.9	17°26.7	36°51.9	8.1	9°10.8	-13.1	60.7
18	88°26.9	17°26.1	51°19.0	8.1	8°57.7	-13.1	60.7
19	103°27.0	17°25.4	65°46.2	8.2	8°44.5	-13.2	60.7
20	118°27.0	17°24.8	80°13.4	8.3	8°31.3	-13.2	60.7
21	133°27.1	17°24.1	94°40.7	8.3	8°18.1	-13.3	60.7
22	148°27.1	17°23.5	109°08.1	8.4	8°04.8	-13.3	60.6
23	163°27.2	17°22.8	123°35.5	8.5	7°51.5	-13.3	60.6
	SD.=15.8	d=-0.6			S.D.=16.6		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°27.3	17°22.1	138°03.0	8.5	7°38.2	-13.4	60.6
1	193°27.3	17°21.5	152°30.6	8.6	7°24.8	-13.4	60.6
2	208°27.4	17°20.8	166°58.2	8.6	7°11.3	-13.4	60.6
3	223°27.4	17°20.2	181°25.9	8.7	6°57.9	-13.5	60.5
4	238°27.5	17°19.5	195°53.6	8.8	6°44.4	-13.5	60.5
5	253°27.5	17°18.8	210°21.4	8.8	6°30.9	-13.5	60.5
6	268°27.6	17°18.2	224°49.2	8.9	6°17.3	-13.6	60.5
7	283°27.6	17°17.5	239°17.1	8.9	6°03.7	-13.6	60.5
8	298°27.7	17°16.9	253°45.1	9.0	5°50.1	-13.6	60.4
9	313°27.7	17°16.2	268°13.1	9.0	5°36.5	-13.6	60.4
10	328°27.8	17°15.5	282°41.2	9.1	5°22.8	-13.7	60.4
11	343°27.9	17°14.9	297°09.3	9.2	5°09.1	-13.7	60.4
12	358°27.9	17°14.2	311°37.5	9.2	4°55.4	-13.7	60.3
13	13°28.0	17°13.5	326°05.7	9.3	4°41.7	-13.7	60.3
14	28°28.0	17°12.9	340°34.0	9.3	4°28.0	-13.7	60.3
15	43°28.1	17°12.2	355°02.4	9.4	4°14.3	-13.8	60.3
16	58°28.1	17°11.5	9°30.7	9.4	4°00.5	-13.8	60.3
17	73°28.2	17°10.9	23°59.2	9.5	3°46.7	-13.8	60.2
18	88°28.3	17°10.2	38°27.7	9.5	3°32.9	-13.8	60.2
19	103°28.3	17°09.5	52°56.2	9.6	3°19.2	-13.8	60.2
20	118°28.4	17°08.9	67°24.8	9.6	3°05.4	-13.8	60.1
21	133°28.4	17°08.2	81°53.4	9.6	2°51.6	-13.8	60.1
22	148°28.5	17°07.5	96°22.1	9.7	2°37.8	-13.8	60.1
23	163°28.5	17°06.9	110°50.8	9.7	2°24.0	-13.8	60.1
	SD.=15.8	d=-0.7			S.D.=16.5		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	01:41	22:25	–:–	–:–
68	–:–	–:–	02:24	21:45	–:–	–:–
66	–:–	00:49	02:52	21:17	23:12	–:–
64	–:–	01:49	03:13	20:57	22:19	–:–
62	–:–	02:22	03:30	20:40	21:47	–:–
60	00:44	02:45	03:45	20:26	21:25	23:18
58	01:39	03:04	03:57	20:14	21:07	22:29
56	02:09	03:19	04:07	20:04	20:52	22:01
54	02:31	03:32	04:16	19:55	20:39	21:39
52	02:48	03:43	04:24	19:47	20:28	21:22
50	03:03	03:53	04:32	19:40	20:18	21:08
45	03:31	04:14	04:47	19:25	19:58	20:40
40	03:53	04:30	04:60	19:12	19:42	20:19
35	04:09	04:43	05:11	19:01	19:29	20:02
30	04:23	04:54	05:20	18:52	19:18	19:49
20	04:45	05:13	05:36	18:36	18:60	19:27
10	05:02	05:28	05:50	18:22	18:45	19:10
0	05:16	05:41	06:03	18:10	18:31	18:57
-10	05:28	05:54	06:16	17:57	18:19	18:44
-20	05:39	06:06	06:29	17:44	18:07	18:33
-30	05:50	06:19	06:44	17:28	17:54	18:22
-35	05:56	06:26	06:53	17:20	17:46	18:17
-40	06:02	06:34	07:03	17:10	17:38	18:11
-45	06:08	06:43	07:15	16:58	17:30	18:05
-50	06:15	06:54	07:29	16:44	17:19	17:58
-52	06:18	06:59	07:36	16:37	17:14	17:55
-54	06:21	07:04	07:43	16:30	17:09	17:52
-56	06:24	07:10	07:51	16:22	17:04	17:49
-58	06:28	07:16	08:00	16:13	16:57	17:45
-60	06:32	07:23	08:11	16:02	16:50	17:41

Lat.	Moonrise			Moonset		
	Fri	Sat	Sun	Fri	Sat	Sun
72	02:43	05:33	07:53	22:49	22:24	22:05
70	03:33	05:54	08:02	22:27	22:13	22:02
68	04:04	06:10	08:09	22:09	22:04	21:59
66	04:27	06:23	08:15	21:54	21:56	21:57
64	04:45	06:33	08:19	21:42	21:50	21:55
62	04:59	06:42	08:24	21:32	21:44	21:53
60	05:12	06:50	08:27	21:23	21:39	21:51
58	05:22	06:57	08:30	21:16	21:34	21:50
56	05:31	07:03	08:33	21:09	21:30	21:49
54	05:40	07:08	08:36	21:03	21:27	21:48
52	05:47	07:13	08:38	20:57	21:24	21:47
50	05:53	07:17	08:40	20:52	21:21	21:46
45	06:07	07:27	08:45	20:41	21:14	21:44
40	06:19	07:34	08:49	20:32	21:09	21:42
35	06:29	07:41	08:52	20:24	21:04	21:41
30	06:37	07:47	08:55	20:17	20:60	21:39
20	06:52	07:57	08:60	20:05	20:53	21:37
10	07:05	08:06	09:04	19:54	20:46	21:35
0	07:17	08:14	09:08	19:44	20:40	21:33
-10	07:29	08:22	09:12	19:34	20:34	21:31
-20	07:41	08:31	09:17	19:23	20:27	21:29
-30	07:56	08:41	09:21	19:10	20:19	21:26
-35	08:04	08:46	09:24	19:03	20:15	21:25
-40	08:14	08:53	09:28	18:55	20:10	21:23
-45	08:25	09:00	09:31	18:45	20:04	21:21
-50	08:38	09:09	09:36	18:33	19:57	21:19
-52	08:44	09:13	09:38	18:27	19:53	21:18
-54	08:51	09:18	09:40	18:21	19:50	21:17
-56	08:59	09:23	09:42	18:14	19:46	21:15
-58	09:08	09:28	09:45	18:06	19:41	21:14
-60	09:17	09:35	09:48	17:58	19:36	21:12

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
2	06:20	06:18	12:06	13:30	01:01	1(3%)
3	06:16	06:13	12:06	14:26	01:59	2(8%)
4	06:11	06:08	12:06	15:20	02:54	3(16%)

August 05, 06 ,07 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	313°15.4	180°45.0	18°49.9	168°53.5	15°23.3	59°56.7	-22°07.3	26°35.6	-22°16.4
1	328°17.9	195°44.4	18°49.2	183°54.4	15°22.7	74°59.2	-22°07.3	41°38.2	-22°16.4
2	343°20.3	210°43.7	18°48.4	198°55.3	15°22.2	90°01.7	-22°07.3	56°40.8	-22°16.5
3	358°22.8	225°43.0	18°47.6	213°56.2	15°21.7	105°04.2	-22°07.3	71°43.5	-22°16.5
4	13°25.2	240°42.3	18°46.9	228°57.1	15°21.2	120°06.7	-22°07.3	86°46.1	-22°16.5
5	28°27.7	255°41.6	18°46.1	243°58.1	15°20.7	135°09.3	-22°07.3	101°48.7	-22°16.5
6	43°30.2	270°40.9	18°45.3	258°59.0	15°20.1	150°11.8	-22°07.3	116°51.4	-22°16.5
7	58°32.6	285°40.2	18°44.5	273°59.9	15°19.6	165°14.3	-22°07.3	131°54.0	-22°16.6
8	73°35.1	300°39.5	18°43.8	289°00.8	15°19.1	180°16.8	-22°07.3	146°56.6	-22°16.6
9	88°37.6	315°38.8	18°43.0	304°01.7	15°18.6	195°19.3	-22°07.3	161°59.2	-22°16.6
10	103°40.0	330°38.1	18°42.2	319°02.6	15°18.1	210°21.8	-22°07.3	177°01.9	-22°16.6
11	118°42.5	345°37.5	18°41.4	334°03.5	15°17.6	225°24.4	-22°07.3	192°04.5	-22°16.7
12	133°45.0	0°36.8	18°40.7	349°04.4	15°17.0	240°26.9	-22°07.3	207°07.1	-22°16.7
13	148°47.4	15°36.1	18°39.9	4°05.3	15°16.5	255°29.4	-22°07.3	222°09.7	-22°16.7
14	163°49.9	30°35.4	18°39.1	19°06.2	15°16.0	270°31.9	-22°07.3	237°12.4	-22°16.7
15	178°52.3	45°34.7	18°38.3	34°07.2	15°15.5	285°34.4	-22°07.3	252°15.0	-22°16.7
16	193°54.8	60°34.0	18°37.6	49°08.1	15°15.0	300°36.9	-22°07.4	267°17.6	-22°16.8
17	208°57.3	75°33.3	18°36.8	64°09.0	15°14.4	315°39.4	-22°07.4	282°20.2	-22°16.8
18	223°59.7	90°32.7	18°36.0	79°09.9	15°13.9	330°42.0	-22°07.4	297°22.9	-22°16.8
19	239°02.2	105°32.0	18°35.2	94°10.8	15°13.4	345°44.5	-22°07.4	312°25.5	-22°16.8
20	254°04.7	120°31.3	18°34.4	109°11.7	15°12.9	0°47.0	-22°07.4	327°28.1	-22°16.8
21	269°07.1	135°30.6	18°33.6	124°12.6	15°12.4	15°49.5	-22°07.4	342°30.8	-22°16.9
22	284°09.6	150°29.9	18°32.8	139°13.5	15°11.8	30°52.0	-22°07.4	357°33.4	-22°16.9
23	299°12.1	165°29.2	18°32.1	154°14.4	15°11.3	45°54.5	-22°07.4	12°36.0	-22°16.9
	Mer.pass.:3:06:	v-0.7 d-0.8 m-3.8		v0.9 d-0.5 m1.8		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	314°14.5	180°28.6	18°31.3	169°15.4	15°10.8	60°57.0	-22°07.4	27°38.6	-22°16.9
1	329°17.0	195°27.9	18°30.5	184°16.3	15°10.3	75°59.5	-22°07.4	42°41.3	-22°17.0
2	344°19.5	210°27.2	18°29.7	199°17.2	15°09.8	91°02.1	-22°07.4	57°43.9	-22°17.0
3	359°21.9	225°26.5	18°28.9	214°18.1	15°09.2	106°04.6	-22°07.4	72°46.5	-22°17.0
4	14°24.4	240°25.8	18°28.1	229°19.0	15°08.7	121°07.1	-22°07.4	87°49.1	-22°17.0
5	29°26.8	255°25.2	18°27.3	244°19.9	15°08.2	136°09.6	-22°07.4	102°51.8	-22°17.0
6	44°29.3	270°24.5	18°26.5	259°20.8	15°07.7	151°12.1	-22°07.4	117°54.4	-22°17.1
7	59°31.8	285°23.8	18°25.7	274°21.7	15°07.1	166°14.6	-22°07.4	132°57.0	-22°17.1
8	74°34.2	300°23.1	18°24.9	289°22.6	15°06.6	181°17.1	-22°07.4	147°59.6	-22°17.1
9	89°36.7	315°22.5	18°24.1	304°23.6	15°06.1	196°19.6	-22°07.4	163°02.3	-22°17.1
10	104°39.2	330°21.8	18°23.3	319°24.5	15°05.6	211°22.1	-22°07.4	178°04.9	-22°17.1
11	119°41.6	345°21.1	18°22.5	334°25.4	15°05.1	226°24.6	-22°07.4	193°07.5	-22°17.2
12	134°44.1	0°20.4	18°21.7	349°26.3	15°04.5	241°27.1	-22°07.4	208°10.1	-22°17.2
13	149°46.6	15°19.8	18°20.9	4°27.2	15°04.0	256°29.7	-22°07.4	223°12.8	-22°17.2
14	164°49.0	30°19.1	18°20.1	19°28.1	15°03.5	271°32.2	-22°07.4	238°15.4	-22°17.2
15	179°51.5	45°18.4	18°19.3	34°29.0	15°03.0	286°34.7	-22°07.4	253°18.0	-22°17.2
16	194°53.9	60°17.7	18°18.5	49°30.0	15°02.4	301°37.2	-22°07.4	268°20.6	-22°17.3
17	209°56.4	75°17.1	18°17.7	64°30.9	15°01.9	316°39.7	-22°07.4	283°23.3	-22°17.3
18	224°58.9	90°16.4	18°16.9	79°31.8	15°01.4	331°42.2	-22°07.4	298°25.9	-22°17.3
19	240°01.3	105°15.7	18°16.1	94°32.7	15°00.9	346°44.7	-22°07.4	313°28.5	-22°17.3
20	255°03.8	120°15.0	18°15.3	109°33.6	15°00.3	1°47.2	-22°07.4	328°31.1	-22°17.4
21	270°06.3	135°14.4	18°14.5	124°34.5	14°59.8	16°49.7	-22°07.4	343°33.7	-22°17.4
22	285°08.7	150°13.7	18°13.7	139°35.4	14°59.3	31°52.2	-22°07.4	358°36.4	-22°17.4
23	300°11.2	165°13.0	18°12.9	154°36.3	14°58.8	46°54.7	-22°07.5	13°39.0	-22°17.4
	Mer.pass.:3:02:	v-0.7 d-0.8 m-3.8		v0.9 d-0.5 m1.8		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	315°13.7	180°12.4	18°12.1	169°37.3	14°58.2	61°57.2	-22°07.5	28°41.6	-22°17.4
1	330°16.1	195°11.7	18°11.3	184°38.2	14°57.7	76°59.7	-22°07.5	43°44.2	-22°17.5
2	345°18.6	210°11.0	18°10.5	199°39.1	14°57.2	92°02.2	-22°07.5	58°46.9	-22°17.5
3	0°21.1	225°10.4	18°09.7	214°40.0	14°56.7	107°04.7	-22°07.5	73°49.5	-22°17.5
4	15°23.5	240°09.7	18°08.8	229°40.9	14°56.1	122°07.2	-22°07.5	88°52.1	-22°17.5
5	30°26.0	255°09.0	18°08.0	244°41.8	14°55.6	137°09.7	-22°07.5	103°54.7	-22°17.5
6	45°28.4	270°08.4	18°07.2	259°42.8	14°55.1	152°12.2	-22°07.5	118°57.4	-22°17.6
7	60°30.9	285°07.7	18°06.4	274°43.7	14°54.6	167°14.7	-22°07.5	133°60.0	-22°17.6
8	75°33.4	300°07.0	18°05.6	289°44.6	14°54.0	182°17.2	-22°07.5	149°02.6	-22°17.6
9	90°35.8	315°06.4	18°04.8	304°45.5	14°53.5	197°19.7	-22°07.5	164°05.2	-22°17.6
10	105°38.3	330°05.7	18°03.9	319°46.4	14°53.0	212°22.2	-22°07.5	179°07.8	-22°17.6
11	120°40.8	345°05.0	18°03.1	334°47.3	14°52.5	227°24.7	-22°07.5	194°10.5	-22°17.7
12	135°43.2	0°04.4	18°02.3	349°48.2	14°51.9	242°27.2	-22°07.5	209°13.1	-22°17.7
13	150°45.7	15°03.7	18°01.5	4°49.2	14°51.4	257°29.7	-22°07.5	224°15.7	-22°17.7
14	165°48.2	30°03.0	18°00.7	19°50.1	14°50.9	272°32.2	-22°07.5	239°18.3	-22°17.7
15	180°50.6	45°02.4	17°59.8	34°51.0	14°50.4	287°34.7	-22°07.5	254°21.0	-22°17.8
16	195°53.1	60°01.7	17°59.0	49°51.9	14°49.8	302°37.2	-22°07.5	269°23.6	-22°17.8
17	210°55.6	75°01.0	17°58.2	64°52.8	14°49.3	317°39.7	-22°07.5	284°26.2	-22°17.8
18	225°58.0	90°00.4	17°57.4	79°53.7	14°48.8	332°42.2	-22°07.5	299°28.8	-22°17.8
19	241°00.5	104°59.7	17°56.5	94°54.7	14°48.2	347°44.7	-22°07.5	314°31.4	-22°17.8
20	256°02.9	119°59.1	17°55.7	109°55.6	14°47.7	2°47.2	-22°07.5	329°34.1	-22°17.9
21	271°05.4	134°58.4	17°54.9	124°56.5	14°47.2	17°49.7	-22°07.5	344°36.7	-22°17.9
22	286°07.9	149°57.7	17°54.0	139°57.4	14°46.7	32°52.2	-22°07.5	359°39.3	-22°17.9
23	301°10.3	164°57.1	17°53.2	154°58.3	14°46.1	47°54.7	-22°07.6	14°41.9	-22°17.9
	Mer.pass.:2:58:	v-0.7 d-0.8 m-3.8		v0.9 d-0.5 m1.8		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Stars	SHA	Dec
Alpheratz	357°38.9	29°11.8
Ankaa	353°11.3	-42°11.8
Schedar	349°35.4	56°38.4
Diphda	348°51.4	-17°52.7
Achernar	335°23.4	-57°08.1
Hamal	327°56.0	23°33.1
Polaris	315°57.5	89°20.4
Akamar	315°15.1	-40°13.4
Menkar	314°10.7	4°09.9
Mirfak	308°34.4	49°55.5
Aldebaran	290°44.7	16°32.8
Rigel	281°08.2	-8°10.8
Capella	280°28.5	46°00.8
Bellatrix	278°27.7	6°22.0
Elnath	278°07.5	28°37.3
Alnilam	275°42.3	-1°11.4
Betelgeuse	270°57.0	7°24.6
Canopus	263°54.7	-52°42.3
Sirius	258°30.2	-16°44.4
Adara	255°09.6	-28°59.9
Procyon	244°55.6	5°10.6
Pollux	243°22.9	27°58.7
Avior	234°17.0	-59°34.3
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.1	-63°12.5
Gacrux	171°56.6	-57°13.4
Alioth	166°17.3	55°51.6
Spica	158°26.9	-11°15.6
Alcaid	152°55.7	49°13.4
Hadar	148°42.0	-60°28.1
Menkent	148°02.7	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.0	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.0	74°05.0
Alphecca	126°07.4	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.6	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.1
Etamin	90°43.8	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.3
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.0	-56°40.2
Deneb	49°28.2	45°21.1
Enif	33°42.7	9°58.0
Alnair	27°38.0	-46°51.8
Fomalhaut	15°19.1	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.9	15°18.6

2019/8/5	SHA	Mer.pass
Venus	227°29.7	11:58
Mars	215°38.1	12:44
Jupiter	106°41.3	19:57
Saturn	73°20.2	22:10

2019/8/6	SHA	Mer.pass
Venus	226°14.0	11:59
Mars	215°00.8	12:42
Jupiter	106°42.5	19:53
Saturn	73°24.1	22:06

2019/8/7	SHA	Mer.pass
Venus	224°58.7	11:60
Mars	214°23.6	12:41
Jupiter	106°43.5	19:49
Saturn	73°28.0	22:01

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	178°28.6	17°06.2	125°19.5	9.8	2°10.1	-13.8	60.0
1	193°28.7	17°05.5	139°48.3	9.8	1°56.3	-13.8	60.0
2	208°28.7	17°04.8	154°17.2	9.9	1°42.5	-13.8	60.0
3	223°28.8	17°04.2	168°46.0	9.9	1°28.7	-13.8	60.0
4	238°28.8	17°03.5	183°15.0	9.9	1°14.9	-13.8	59.9
5	253°28.9	17°02.8	197°43.9	10.0	1°01.1	-13.8	59.9
6	268°29.0	17°02.1	212°12.9	10.0	0°47.4	-13.8	59.9
7	283°29.0	17°01.5	226°42.0	10.1	0°33.6	-13.8	59.9
8	298°29.1	17°00.8	241°11.0	10.1	0°19.8	-13.8	59.8
9	313°29.1	17°00.1	255°40.1	10.1	0°06.1	-13.7	59.8
10	328°29.2	16°59.5	270°09.3	10.2	-0°07.7	-13.7	59.8
11	343°29.3	16°58.8	284°38.5	10.2	-0°21.4	-13.7	59.7
12	358°29.3	16°58.1	299°07.7	10.2	-0°35.1	-13.7	59.7
13	13°29.4	16°57.4	313°36.9	10.3	-0°48.8	-13.7	59.7
14	28°29.5	16°56.7	328°06.2	10.3	-1°02.4	-13.7	59.6
15	43°29.5	16°56.1	342°35.5	10.3	-1°16.1	-13.6	59.6
16	58°29.6	16°55.4	357°04.8	10.3	-1°29.7	-13.6	59.6
17	73°29.7	16°54.7	11°34.2	10.4	-1°43.3	-13.6	59.6
18	88°29.7	16°54.0	26°03.6	10.4	-1°56.9	-13.6	59.5
19	103°29.8	16°53.4	40°33.0	10.4	-2°10.5	-13.5	59.5
20	118°29.8	16°52.7	55°02.4	10.5	-2°24.0	-13.5	59.5
21	133°29.9	16°52.0	69°31.9	10.5	-2°37.5	-13.5	59.4
22	148°30.0	16°51.3	84°01.4	10.5	-2°51.0	-13.5	59.4
23	163°30.0	16°50.6	98°30.9	10.5	-3°04.4	-13.4	59.4
	SD.=15.8	d=-0.7			S.D.=16.4		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	178°30.1	16°49.9	113°00.4	10.5	-3°17.8	-13.4	59.3
1	193°30.2	16°49.3	127°30.0	10.6	-3°31.2	-13.4	59.3
2	208°30.2	16°48.6	141°59.6	10.6	-3°44.5	-13.3	59.3
3	223°30.3	16°47.9	156°29.2	10.6	-3°57.8	-13.3	59.2
4	238°30.4	16°47.2	170°58.8	10.6	-4°11.1	-13.3	59.2
5	253°30.4	16°46.5	185°28.4	10.6	-4°24.3	-13.2	59.2
6	268°30.5	16°45.8	199°58.1	10.7	-4°37.5	-13.2	59.2
7	283°30.6	16°45.2	214°27.7	10.7	-4°50.7	-13.1	59.1
8	298°30.6	16°44.5	228°57.4	10.7	-5°03.8	-13.1	59.1
9	313°30.7	16°43.8	243°27.1	10.7	-5°16.9	-13.1	59.1
10	328°30.8	16°43.1	257°56.8	10.7	-5°29.9	-13.0	59.0
11	343°30.9	16°42.4	272°26.6	10.7	-5°42.9	-13.0	59.0
12	358°30.9	16°41.7	286°56.3	10.7	-5°55.8	-12.9	59.0
13	13°31.0	16°41.0	301°26.1	10.8	-6°08.7	-12.9	58.9
14	28°31.1	16°40.4	315°55.8	10.8	-6°21.6	-12.8	58.9
15	43°31.1	16°39.7	330°25.6	10.8	-6°34.4	-12.8	58.9
16	58°31.2	16°39.0	344°55.4	10.8	-6°47.1	-12.7	58.8
17	73°31.3	16°38.3	359°25.2	10.8	-6°59.8	-12.7	58.8
18	88°31.3	16°37.6	13°55.0	10.8	-7°12.4	-12.6	58.8
19	103°31.4	16°36.9	28°24.8	10.8	-7°25.0	-12.6	58.7
20	118°31.5	16°36.2	42°54.6	10.8	-7°37.6	-12.5	58.7
21	133°31.6	16°35.5	57°24.4	10.8	-7°50.0	-12.5	58.7
22	148°31.6	16°34.8	71°54.2	10.8	-8°02.5	-12.4	58.6
23	163°31.7	16°34.1	86°24.0	10.8	-8°14.8	-12.3	58.6
	SD.=15.8	d=-0.7			S.D.=16.2		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	178°31.8	16°33.4	100°53.9	10.8	-8°27.1	-12.3	58.6
1	193°31.8	16°32.8	115°23.7	10.8	-8°39.4	-12.2	58.5
2	208°31.9	16°32.1	129°53.5	10.8	-8°51.6	-12.2	58.5
3	223°32.0	16°31.4	144°23.4	10.8	-9°03.7	-12.1	58.5
4	238°32.1	16°30.7	158°53.2	10.8	-9°15.8	-12.0	58.4
5	253°32.1	16°30.0	173°23.0	10.8	-9°27.8	-12.0	58.4
6	268°32.2	16°29.3	187°52.9	10.8	-9°39.7	-11.9	58.4
7	283°32.3	16°28.6	202°22.7	10.8	-9°51.6	-11.8	58.3
8	298°32.4	16°27.9	216°52.5	10.8	-10°03.4	-11.8	58.3
9	313°32.4	16°27.2	231°22.4	10.8	-10°15.2	-11.7	58.3
10	328°32.5	16°26.5	245°52.2	10.8	-10°26.8	-11.6	58.2
11	343°32.6	16°25.8	260°22.0	10.8	-10°38.4	-11.6	58.2
12	358°32.7	16°25.1	274°51.8	10.8	-10°50.0	-11.5	58.2
13	13°32.7	16°24.4	289°21.7	10.8	-11°01.4	-11.4	58.1
14	28°32.8	16°23.7	303°51.5	10.8	-11°12.8	-11.4	58.1
15	43°32.9	16°23.0	318°21.3	10.8	-11°24.2	-11.3	58.1
16	58°33.0	16°22.3	332°51.1	10.8	-11°35.4	-11.2	58.0
17	73°33.0	16°21.6	347°20.9	10.8	-11°46.6	-11.1	58.0
18	88°33.1	16°20.9	1°50.6	10.8	-11°57.7	-11.1	58.0
19	103°33.2	16°20.2	16°20.4	10.8	-12°08.7	-11.0	57.9
20	118°33.3	16°19.5	30°50.2	10.8	-12°19.7	-10.9	57.9
21	133°33.3	16°18.8	45°19.9	10.8	-12°30.5	-10.8	57.9
22	148°33.4	16°18.1	59°49.7	10.7	-12°41.3	-10.8	57.8
23	163°33.5	16°17.4	74°19.4	10.7	-12°52.1	-10.7	57.8
	SD.=15.8	d=-0.7			S.D.=16.0		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	00:53	23:05	–:–	–:–
70	–:–	–:–	02:02	22:04	–:–	–:–
68	–:–	–:–	02:38	21:30	–:–	–:–
66	–:–	01:21	03:03	21:06	22:44	–:–
64	–:–	02:05	03:23	20:47	22:03	–:–
62	–:–	02:33	03:39	20:31	21:36	–:–
60	01:13	02:55	03:52	20:18	21:15	22:52
58	01:53	03:12	04:03	20:07	20:58	22:15
56	02:19	03:26	04:13	19:58	20:44	21:50
54	02:39	03:38	04:21	19:49	20:32	21:31
52	02:55	03:49	04:29	19:42	20:22	21:15
50	03:09	03:58	04:36	19:35	20:13	21:01
45	03:36	04:17	04:51	19:20	19:53	20:35
40	03:56	04:33	05:03	19:09	19:38	20:15
35	04:12	04:45	05:13	18:58	19:26	19:59
30	04:25	04:56	05:22	18:50	19:15	19:46
20	04:46	05:14	05:37	18:35	18:58	19:25
10	05:02	05:28	05:50	18:21	18:44	19:09
0	05:16	05:41	06:03	18:09	18:31	18:56
-10	05:27	05:53	06:15	17:57	18:19	18:45
-20	05:38	06:04	06:27	17:45	18:08	18:34
-30	05:48	06:17	06:42	17:30	17:55	18:24
-35	05:54	06:24	06:50	17:22	17:48	18:19
-40	05:59	06:31	06:60	17:12	17:41	18:13
-45	06:05	06:40	07:11	17:01	17:33	18:08
-50	06:11	06:50	07:24	16:48	17:23	18:02
-52	06:14	06:54	07:31	16:42	17:19	17:59
-54	06:16	06:59	07:37	16:35	17:14	17:56
-56	06:19	07:04	07:45	16:28	17:08	17:53
-58	06:23	07:10	07:54	16:19	17:03	17:50
-60	06:26	07:17	08:04	16:09	16:56	17:47

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	10:03	12:10	14:19	21:47	21:28	21:04
70	10:03	12:00	13:58	21:51	21:39	21:26
68	10:02	11:53	13:43	21:54	21:49	21:44
66	10:02	11:47	13:30	21:57	21:57	21:58
64	10:02	11:42	13:19	21:59	22:04	22:09
62	10:02	11:37	13:10	22:01	22:10	22:19
60	10:02	11:33	13:03	22:03	22:15	22:28
58	10:01	11:30	12:56	22:05	22:19	22:36
56	10:01	11:27	12:50	22:06	22:23	22:42
54	10:01	11:24	12:45	22:07	22:27	22:48
52	10:01	11:22	12:40	22:08	22:30	22:54
50	10:01	11:20	12:36	22:10	22:33	22:59
45	10:01	11:15	12:27	22:12	22:40	23:09
40	10:01	11:11	12:19	22:14	22:45	23:18
35	10:01	11:07	12:13	22:16	22:50	23:26
30	10:00	11:04	12:07	22:17	22:54	23:33
20	10:00	10:59	11:57	22:20	23:02	23:44
10	10:00	10:55	11:48	22:22	23:08	23:55
0	10:00	10:51	11:40	22:24	23:14	–:–
-10	09:60	10:46	11:33	22:26	23:20	–:–
-20	09:60	10:42	11:24	22:29	23:27	–:–
-30	09:60	10:37	11:15	22:31	23:34	–:–
-35	09:60	10:34	11:09	22:33	23:39	–:–
-40	09:60	10:31	11:03	22:34	23:44	–:–
-45	09:60	10:27	10:56	22:36	23:49	–:–
-50	09:60	10:23	10:47	22:39	23:56	–:–
-52	09:60	10:21	10:44	22:40	23:59	–:–
-54	09:60	10:19	10:39	22:41	–:–	00:03
-56	09:60	10:17	10:35	22:42	–:–	00:07
-58	09:60	10:14	10:29	22:44	–:–	00:11
-60	09:60	10:11	10:23	22:45	–:–	00:16

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
5	06:06	06:03	12:06	16:12	03:46	4(26%)
6	06:00	05:56	12:05	17:02	04:37	5(37%)
7	05:53	05:49	12:05	17:52	05:27	6(48%)

August 08, 09 ,10 (Thu., Fri., Sat.)

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	316°12.8	179°56.4	17°52.4	169°59.2	14°45.6	62°57.2	-22°07.6	29°44.5	-22°17.9
1	331°15.3	194°55.8	17°51.6	185°00.2	14°45.1	77°59.7	-22°07.6	44°47.2	-22°18.0
2	346°17.7	209°55.1	17°50.7	200°01.1	14°44.5	93°02.2	-22°07.6	59°49.8	-22°18.0
3	1°20.2	224°54.5	17°49.9	215°02.0	14°44.0	108°04.7	-22°07.6	74°52.4	-22°18.0
4	16°22.7	239°53.8	17°49.1	230°02.9	14°43.5	123°07.2	-22°07.6	89°55.0	-22°18.0
5	31°25.1	254°53.1	17°48.2	245°03.8	14°43.0	138°09.7	-22°07.6	104°57.6	-22°18.0
6	46°27.6	269°52.5	17°47.4	260°04.7	14°42.4	153°12.1	-22°07.6	120°00.3	-22°18.1
7	61°30.0	284°51.8	17°46.5	275°05.7	14°41.9	168°14.6	-22°07.6	135°02.9	-22°18.1
8	76°32.5	299°51.2	17°45.7	290°06.6	14°41.4	183°17.1	-22°07.6	150°05.5	-22°18.1
9	91°35.0	314°50.5	17°44.9	305°07.5	14°40.8	198°19.6	-22°07.6	165°08.1	-22°18.1
10	106°37.4	329°49.9	17°44.0	320°08.4	14°40.3	213°22.1	-22°07.6	180°10.7	-22°18.1
11	121°39.9	344°49.2	17°43.2	335°09.3	14°39.8	228°24.6	-22°07.6	195°13.4	-22°18.2
12	136°42.4	359°48.6	17°42.3	350°10.3	14°39.2	243°27.1	-22°07.6	210°16.0	-22°18.2
13	151°44.8	14°47.9	17°41.5	5°11.2	14°38.7	258°29.6	-22°07.6	225°18.6	-22°18.2
14	166°47.3	29°47.3	17°40.7	20°12.1	14°38.2	273°32.1	-22°07.6	240°21.2	-22°18.2
15	181°49.8	44°46.6	17°39.8	35°13.0	14°37.6	288°34.6	-22°07.6	255°23.8	-22°18.2
16	196°52.2	59°46.0	17°39.0	50°13.9	14°37.1	303°37.1	-22°07.6	270°26.5	-22°18.3
17	211°54.7	74°45.3	17°38.1	65°14.9	14°36.6	318°39.5	-22°07.6	285°29.1	-22°18.3
18	226°57.2	89°44.7	17°37.3	80°15.8	14°36.1	333°42.0	-22°07.6	300°31.7	-22°18.3
19	241°59.6	104°44.0	17°36.4	95°16.7	14°35.5	348°44.5	-22°07.7	315°34.3	-22°18.3
20	257°02.1	119°43.4	17°35.6	110°17.6	14°35.0	3°47.0	-22°07.7	330°36.9	-22°18.3
21	272°04.5	134°42.7	17°34.7	125°18.5	14°34.5	18°49.5	-22°07.7	345°39.5	-22°18.4
22	287°07.0	149°42.1	17°33.9	140°19.5	14°33.9	33°52.0	-22°07.7	0°42.2	-22°18.4
23	302°09.5	164°41.4	17°33.0	155°20.4	14°33.4	48°54.5	-22°07.7	15°44.8	-22°18.4
Mer.pass.:2:54:		v-0.7 d-0.8 m-3.8		v0.9 d-0.5 m1.8		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	317°11.9	179°40.8	17°32.2	170°21.3	14°32.9	63°57.0	-22°07.7	30°47.4	-22°18.4
1	332°14.4	194°40.1	17°31.3	185°22.2	14°32.3	78°59.4	-22°07.7	45°50.0	-22°18.4
2	347°16.9	209°39.5	17°30.5	200°23.1	14°31.8	94°01.9	-22°07.7	60°52.6	-22°18.5
3	2°19.3	224°38.8	17°29.6	215°24.1	14°31.3	109°04.4	-22°07.7	75°55.2	-22°18.5
4	17°21.8	239°38.2	17°28.8	230°25.0	14°30.7	124°06.9	-22°07.7	90°57.9	-22°18.5
5	32°24.3	254°37.5	17°27.9	245°25.9	14°30.2	139°09.4	-22°07.7	106°00.5	-22°18.5
6	47°26.7	269°36.9	17°27.1	260°26.8	14°29.7	154°11.9	-22°07.7	121°03.1	-22°18.5
7	62°29.2	284°36.3	17°26.2	275°27.7	14°29.1	169°14.4	-22°07.7	136°05.7	-22°18.6
8	77°31.7	299°35.6	17°25.3	290°28.7	14°28.6	184°16.8	-22°07.7	151°08.3	-22°18.6
9	92°34.1	314°35.0	17°24.5	305°29.6	14°28.1	199°19.3	-22°07.7	166°11.0	-22°18.6
10	107°36.6	329°34.3	17°23.6	320°30.5	14°27.5	214°21.8	-22°07.7	181°13.6	-22°18.6
11	122°39.0	344°33.7	17°22.8	335°31.4	14°27.0	229°24.3	-22°07.7	196°16.2	-22°18.7
12	137°41.5	359°33.0	17°21.9	350°32.3	14°26.5	244°26.8	-22°07.8	211°18.8	-22°18.7
13	152°44.0	14°32.4	17°21.0	5°33.3	14°25.9	259°29.3	-22°07.8	226°21.4	-22°18.7
14	167°46.4	29°31.8	17°20.2	20°34.2	14°25.4	274°31.7	-22°07.8	241°24.0	-22°18.7
15	182°48.9	44°31.1	17°19.3	35°35.1	14°24.8	289°34.2	-22°07.8	256°26.6	-22°18.7
16	197°51.4	59°30.5	17°18.4	50°36.0	14°24.3	304°36.7	-22°07.8	271°29.3	-22°18.8
17	212°53.8	74°29.8	17°17.6	65°37.0	14°23.8	319°39.2	-22°07.8	286°31.9	-22°18.8
18	227°56.3	89°29.2	17°16.7	80°37.9	14°23.2	334°41.7	-22°07.8	301°34.5	-22°18.8
19	242°58.8	104°28.6	17°15.8	95°38.8	14°22.7	349°44.1	-22°07.8	316°37.1	-22°18.8
20	258°01.2	119°27.9	17°15.0	110°39.7	14°22.2	4°46.6	-22°07.8	331°39.7	-22°18.8
21	273°03.7	134°27.3	17°14.1	125°40.6	14°21.6	19°49.1	-22°07.8	346°42.3	-22°18.9
22	288°06.2	149°26.7	17°13.2	140°41.6	14°21.1	34°51.6	-22°07.8	1°45.0	-22°18.9
23	303°08.6	164°26.0	17°12.4	155°42.5	14°20.6	49°54.1	-22°07.8	16°47.6	-22°18.9
Mer.pass.:2:50:		v-0.6 d-0.9 m-3.8		v0.9 d-0.5 m1.7		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	318°11.1	179°25.4	17°11.5	170°43.4	14°20.0	64°56.5	-22°07.8	31°50.2	-22°18.9
1	333°13.5	194°24.8	17°10.6	185°44.3	14°19.5	79°59.0	-22°07.8	46°52.8	-22°18.9
2	348°16.0	209°24.1	17°09.8	200°45.3	14°19.0	95°01.5	-22°07.8	61°55.4	-22°19.0
3	3°18.5	224°23.5	17°08.9	215°46.2	14°18.4	110°04.0	-22°07.8	76°58.0	-22°19.0
4	18°20.9	239°22.9	17°08.0	230°47.1	14°17.9	125°06.4	-22°07.9	92°00.6	-22°19.0
5	33°23.4	254°22.2	17°07.1	245°48.0	14°17.3	140°08.9	-22°07.9	107°03.3	-22°19.0
6	48°25.9	269°21.6	17°06.2	260°49.0	14°16.8	155°11.4	-22°07.9	122°05.9	-22°19.0
7	63°28.3	284°21.0	17°05.4	275°49.9	14°16.3	170°13.9	-22°07.9	137°08.5	-22°19.1
8	78°30.8	299°20.3	17°04.5	290°50.8	14°15.7	185°16.3	-22°07.9	152°11.1	-22°19.1
9	93°33.3	314°19.7	17°03.6	305°51.7	14°15.2	200°18.8	-22°07.9	167°13.7	-22°19.1
10	108°35.7	329°19.1	17°02.7	320°52.7	14°14.7	215°21.3	-22°07.9	182°16.3	-22°19.1
11	123°38.2	344°18.4	17°01.9	335°53.6	14°14.1	230°23.8	-22°07.9	197°18.9	-22°19.1
12	138°40.6	359°17.8	17°01.0	350°54.5	14°13.6	245°26.2	-22°07.9	212°21.6	-22°19.1
13	153°43.1	14°17.2	17°00.1	5°55.4	14°13.0	260°28.7	-22°07.9	227°24.2	-22°19.2
14	168°45.6	29°16.5	16°59.2	20°56.3	14°12.5	275°31.2	-22°07.9	242°26.8	-22°19.2
15	183°48.0	44°15.9	16°58.3	35°57.3	14°12.0	290°33.7	-22°07.9	257°29.4	-22°19.2
16	198°50.5	59°15.3	16°57.4	50°58.2	14°11.4	305°36.1	-22°07.9	272°32.0	-22°19.2
17	213°53.0	74°14.7	16°56.6	65°59.1	14°10.9	320°38.6	-22°07.9	287°34.6	-22°19.2
18	228°55.4	89°14.0	16°55.7	81°00.0	14°10.3	335°41.1	-22°07.9	302°37.2	-22°19.3
19	243°57.9	104°13.4	16°54.8	96°01.0	14°09.8	350°43.6	-22°08.0	317°39.8	-22°19.3
20	259°00.4	119°12.8	16°53.9	111°01.9	14°09.3	5°46.0	-22°08.0	332°42.5	-22°19.3
21	274°02.8	134°12.2	16°53.0	126°02.8	14°08.7	20°48.5	-22°08.0	347°45.1	-22°19.3
22	289°05.3	149°11.5	16°52.1	141°03.8	14°08.2	35°51.0	-22°08.0	2°47.7	-22°19.3
23	304°07.8	164°10.9	16°51.2	156°04.7	14°07.6	50°53.4	-22°08.0	17°50.3	-22°19.4
Mer.pass.:2:46:		v-0.6 d-0.9 m-3.8		v0.9 d-0.5 m1.7		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Stars

	SHA	Dec
Alpheratz	357°38.9	29°11.8
Ankaa	353°11.2	-42°11.8
Schedar	349°35.4	56°38.4
Diphda	348°51.4	-17°52.7
Achernar	335°23.4	-57°08.1
Hamal	327°55.9	23°33.1
Polaris	315°55.9	89°20.4
Akamar	315°15.1	-40°13.4
Menkar	314°10.6	4°09.9
Mirfak	308°34.4	49°55.5
Aldebaran	290°44.7	16°32.8
Rigel	281°08.2	-8°10.7
Capella	280°28.5	46°00.8
Bellatrix	278°27.7	6°22.0
Elnath	278°07.5	28°37.3
Alnilam	275°42.3	-1°11.4
Betelgeuse	270°57.0	7°24.6
Canopus	263°54.7	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.6	5°10.6
Pollux	243°22.8	27°58.7
Avior	234°17.0	-59°34.3
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.1	-63°12.5
Gacrux	171°56.6	-57°13.4
Alioth	166°17.3	55°51.6
Spica	158°26.9	-11°15.6
Alcaid	152°55.7	49°13.4
Hadar	148°42.1	-60°28.1
Menkent	148°02.7	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.1	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.1	74°05.0
Alphecca	126°07.4	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.7	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.3	12°33.1
Etamin	90°43.8	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.0	-56°40.2
Deneb	49°28.2	45°21.1
Enif	33°42.7	9°58.0
Alnair	27°38.0	-46°51.8
Fomalhaut	15°19.1	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.9	15°18.6

2019/8/8	SHA	Mer.pass
Venus	223°43.6	12:01
Mars	213°46.4	12:39
Jupiter	106°44.4	19:45
Saturn	73°31.7	21:57

2019/8/9	SHA	Mer.pass
Venus	222°28.8	12:02
Mars	213°09.4	12:38
Jupiter	106°45.0	19:41
Saturn	73°35.5	21:53

2019/8/1	SHA	Mer.pass
Venus	221°14.3	12:03
Mars	212°32.3	12:36
Jupiter	106°45.5	19:37
Saturn	73°39.1	21:49

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	178°33.6	16°16.7	88°49.1	10.7	-13°02.7	-10.6	57.8
1	193°33.7	16°16.0	103°18.9	10.7	-13°13.3	-10.5	57.8
2	208°33.7	16°15.3	117°48.6	10.7	-13°23.7	-10.4	57.7
3	223°33.8	16°14.6	132°18.2	10.7	-13°34.1	-10.4	57.7
4	238°33.9	16°13.9	146°47.9	10.7	-13°44.4	-10.3	57.7
5	253°34.0	16°13.1	161°17.6	10.7	-13°54.7	-10.2	57.6
6	268°34.1	16°12.4	175°47.3	10.6	-14°04.8	-10.1	57.6
7	283°34.1	16°11.7	190°16.9	10.6	-14°14.9	-10.0	57.6
8	298°34.2	16°11.0	204°46.5	10.6	-14°24.9	-9.9	57.5
9	313°34.3	16°10.3	219°16.1	10.6	-14°34.7	-9.8	57.5
10	328°34.4	16°09.6	233°45.7	10.6	-14°44.6	-9.8	57.5
11	343°34.5	16°08.9	248°15.3	10.6	-14°54.3	-9.7	57.4
12	358°34.5	16°08.2	262°44.9	10.6	-15°03.9	-9.6	57.4
13	13°34.6	16°07.5	277°14.5	10.6	-15°13.4	-9.5	57.4
14	28°34.7	16°06.8	291°44.0	10.5	-15°22.9	-9.4	57.3
15	43°34.8	16°06.1	306°13.5	10.5	-15°32.2	-9.3	57.3
16	58°34.9	16°05.3	320°43.0	10.5	-15°41.5	-9.2	57.3
17	73°35.0	16°04.6	335°12.5	10.5	-15°50.7	-9.1	57.3
18	88°35.0	16°03.9	349°42.0	10.5	-15°59.7	-9.0	57.2
19	103°35.1	16°03.2	4°11.5	10.5	-16°08.7	-8.9	57.2
20	118°35.2	16°02.5	18°40.9	10.4	-16°17.6	-8.8	57.2
21	133°35.3	16°01.8	33°10.4	10.4	-16°26.4	-8.8	57.1
22	148°35.4	16°01.1	47°39.8	10.4	-16°35.1	-8.7	57.1
23	163°35.5	16°00.4	62°09.2	10.4	-16°43.7	-8.6	57.1
	SD.=15.8	d=-0.7			S.D.=15.8		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	178°35.6	15°59.6	76°38.6	10.4	-16°52.3	-8.5	57.0
1	193°35.6	15°58.9	91°08.0	10.4	-17°00.7	-8.4	57.0
2	208°35.7	15°58.2	105°37.3	10.3	-17°09.0	-8.3	57.0
3	223°35.8	15°57.5	120°06.6	10.3	-17°17.2	-8.2	57.0
4	238°35.9	15°56.8	134°36.0	10.3	-17°25.3	-8.1	56.9
5	253°36.0	15°56.1	149°05.3	10.3	-17°33.3	-8.0	56.9
6	268°36.1	15°55.3	163°34.6	10.3	-17°41.3	-7.9	56.9
7	283°36.2	15°54.6	178°03.8	10.3	-17°49.1	-7.8	56.8
8	298°36.2	15°53.9	192°33.1	10.2	-17°56.8	-7.7	56.8
9	313°36.3	15°53.2	207°02.3	10.2	-18°04.4	-7.6	56.8
10	328°36.4	15°52.5	221°31.5	10.2	-18°11.9	-7.5	56.8
11	343°36.5	15°51.8	236°00.8	10.2	-18°19.4	-7.4	56.7
12	358°36.6	15°51.0	250°29.9	10.2	-18°26.7	-7.3	56.7
13	13°36.7	15°50.3	264°59.1	10.2	-18°33.9	-7.2	56.7
14	28°36.8	15°49.6	279°28.3	10.2	-18°41.0	-7.1	56.6
15	43°36.9	15°48.9	293°57.4	10.1	-18°48.0	-6.9	56.6
16	58°36.9	15°48.1	308°26.6	10.1	-18°54.9	-6.8	56.6
17	73°37.0	15°47.4	322°55.7	10.1	-19°01.7	-6.7	56.6
18	88°37.1	15°46.7	337°24.8	10.1	-19°08.3	-6.6	56.5
19	103°37.2	15°46.0	351°53.9	10.1	-19°14.9	-6.5	56.5
20	118°37.3	15°45.3	6°22.9	10.1	-19°21.4	-6.4	56.5
21	133°37.4	15°44.5	20°52.0	10.1	-19°27.7	-6.3	56.4
22	148°37.5	15°43.8	35°21.0	10.0	-19°34.0	-6.2	56.4
23	163°37.6	15°43.1	49°50.1	10.0	-19°40.1	-6.1	56.4
	SD.=15.8	d=-0.7			S.D.=15.6		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	178°37.7	15°42.4	64°19.1	10.0	-19°46.2	-6.0	56.4
1	193°37.8	15°41.6	78°48.1	10.0	-19°52.1	-5.9	56.3
2	208°37.9	15°40.9	93°17.1	10.0	-19°57.9	-5.8	56.3
3	223°37.9	15°40.2	107°46.1	10.0	-20°03.6	-5.7	56.3
4	238°38.0	15°39.4	122°15.0	10.0	-20°09.2	-5.5	56.3
5	253°38.1	15°38.7	136°44.0	10.0	-20°14.7	-5.4	56.2
6	268°38.2	15°38.0	151°12.9	9.9	-20°20.1	-5.3	56.2
7	283°38.3	15°37.3	165°41.9	9.9	-20°25.4	-5.2	56.2
8	298°38.4	15°36.5	180°10.8	9.9	-20°30.5	-5.1	56.2
9	313°38.5	15°35.8	194°39.7	9.9	-20°35.6	-5.0	56.1
10	328°38.6	15°35.1	209°08.6	9.9	-20°40.5	-4.9	56.1
11	343°38.7	15°34.3	223°37.5	9.9	-20°45.3	-4.8	56.1
12	358°38.8	15°33.6	238°06.4	9.9	-20°50.0	-4.6	56.1
13	13°38.9	15°32.9	252°35.3	9.9	-20°54.6	-4.5	56.0
14	28°39.0	15°32.2	267°04.2	9.9	-20°59.1	-4.4	56.0
15	43°39.1	15°31.4	281°33.1	9.9	-21°03.5	-4.3	56.0
16	58°39.2	15°30.7	296°01.9	9.9	-21°07.7	-4.2	56.0
17	73°39.3	15°30.0	310°30.8	9.9	-21°11.8	-4.1	55.9
18	88°39.4	15°29.2	324°59.7	9.9	-21°15.9	-4.0	55.9
19	103°39.4	15°28.5	339°28.5	9.9	-21°19.8	-3.9	55.9
20	118°39.5	15°27.8	353°57.4	9.8	-21°23.6	-3.7	55.9
21	133°39.6	15°27.0	8°26.2	9.8	-21°27.3	-3.6	55.8
22	148°39.7	15°26.3	22°55.1	9.8	-21°30.8	-3.5	55.8
23	163°39.8	15°25.6	37°23.9	9.8	-21°34.3	-3.4	55.8
	SD.=15.8	d=-0.7			S.D.=15.4		

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
72	–:–	–:–	01:32	22:30	–:–	–:–
70	–:–	–:–	02:21	21:45	–:–	–:–
68	–:–	00:13	02:52	21:16	23:27	–:–
66	–:–	01:44	03:15	20:54	22:22	–:–
64	–:–	02:19	03:32	20:37	21:48	–:–
62	00:12	02:44	03:47	20:22	21:24	23:32
60	01:33	03:04	03:59	20:10	21:05	22:33
58	02:06	03:20	04:09	20:00	20:49	22:02
56	02:29	03:33	04:19	19:51	20:36	21:40
54	02:47	03:44	04:27	19:43	20:25	21:22
52	03:02	03:54	04:34	19:36	20:16	21:07
50	03:15	04:03	04:40	19:30	20:07	20:54
45	03:41	04:21	04:54	19:16	19:49	20:29
40	03:60	04:36	05:06	19:05	19:34	20:10
35	04:15	04:48	05:15	18:55	19:23	19:55
30	04:28	04:58	05:24	18:47	19:13	19:43
20	04:48	05:15	05:38	18:33	18:56	19:23
10	05:03	05:29	05:51	18:20	18:42	19:08
0	05:16	05:41	06:02	18:09	18:30	18:55
-10	05:27	05:52	06:14	17:58	18:19	18:45
-20	05:37	06:03	06:26	17:46	18:08	18:35
-30	05:46	06:15	06:39	17:32	17:57	18:25
-35	05:51	06:21	06:47	17:24	17:51	18:21
-40	05:56	06:28	06:56	17:15	17:44	18:16
-45	06:01	06:36	07:07	17:05	17:36	18:11
-50	06:06	06:45	07:19	16:52	17:27	18:05
-52	06:09	06:49	07:25	16:47	17:23	18:03
-54	06:11	06:54	07:32	16:40	17:18	18:01
-56	06:14	06:58	07:39	16:33	17:14	17:58
-58	06:17	07:04	07:47	16:25	17:08	17:55
-60	06:20	07:10	07:56	16:16	17:02	17:52

Lat.	Moonrise			Moonset		
	Thu	Fri	Sat	Thu	Fri	Sat
72	16:44	–:–	–:–	20:24	–:–	–:–
70	16:02	18:28	–:–	21:08	20:28	–:–
68	15:33	17:27	19:30	21:37	21:30	21:14
66	15:12	16:53	18:28	21:60	22:05	22:17
64	14:55	16:28	17:53	22:17	22:30	22:52
62	14:41	16:09	17:28	22:32	22:50	23:17
60	14:30	15:53	17:08	22:44	23:07	23:37
58	14:20	15:39	16:52	22:55	23:20	23:54
56	14:11	15:28	16:38	23:05	23:32	–:–
54	14:03	15:18	16:26	23:13	23:43	–:–
52	13:56	15:09	16:16	23:20	23:52	–:–
50	13:50	15:01	16:07	23:27	–:–	00:00
45	13:37	14:44	15:47	23:42	–:–	00:18
40	13:26	14:30	15:31	23:54	–:–	00:33
35	13:16	14:18	15:18	–:–	00:04	00:45
30	13:08	14:08	15:06	–:–	00:13	00:56
20	12:54	13:51	14:46	–:–	00:28	01:14
10	12:42	13:35	14:29	–:–	00:42	01:31
0	12:31	13:21	14:13	00:04	00:55	01:46
-10	12:19	13:07	13:57	00:14	01:08	02:01
-20	12:07	12:52	13:39	00:24	01:21	02:17
-30	11:54	12:35	13:20	00:36	01:37	02:36
-35	11:46	12:25	13:08	00:43	01:46	02:47
-40	11:37	12:14	12:55	00:51	01:57	02:60
-45	11:27	12:01	12:40	01:00	02:09	03:14
-50	11:14	11:45	12:21	01:11	02:24	03:33
-52	11:08	11:37	12:12	01:17	02:31	03:41
-54	11:02	11:29	12:02	01:22	02:39	03:51
-56	10:55	11:20	11:51	01:29	02:48	04:02
-58	10:47	11:09	11:38	01:36	02:58	04:14
-60	10:38	10:57	11:23	01:44	03:09	04:29

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
8	05:46	05:42	12:05	18:42	06:17	7(58%)
9	05:38	05:34	12:05	19:33	07:08	8(69%)
10	05:29	05:25	12:05	20:25	07:59	9(78%)

August 11, 12 ,13 (Sun., Mon., Tue.)

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	319°10.2	179°10.3	16°50.3	171°05.6	14°07.1	65°55.9	-22°08.0	32°52.9	-22°19.4
1	334°12.7	194°09.7	16°49.4	186°06.5	14°06.6	80°58.4	-22°08.0	47°55.5	-22°19.4
2	349°15.1	209°09.0	16°48.5	201°07.5	14°06.0	96°00.8	-22°08.0	62°58.1	-22°19.4
3	4°17.6	224°08.4	16°47.6	216°08.4	14°05.5	111°03.3	-22°08.0	78°00.7	-22°19.4
4	19°20.1	239°07.8	16°46.8	231°09.3	14°04.9	126°05.8	-22°08.0	93°03.4	-22°19.5
5	34°22.5	254°07.2	16°45.9	246°10.2	14°04.4	141°08.3	-22°08.0	108°06.0	-22°19.5
6	49°25.0	269°06.5	16°45.0	261°11.2	14°03.9	156°10.7	-22°08.0	123°08.6	-22°19.5
7	64°27.5	284°05.9	16°44.1	276°12.1	14°03.3	171°13.2	-22°08.0	138°11.2	-22°19.5
8	79°29.9	299°05.3	16°43.2	291°13.0	14°02.8	186°15.7	-22°08.1	153°13.8	-22°19.5
9	94°32.4	314°04.7	16°42.3	306°13.9	14°02.2	201°18.1	-22°08.1	168°16.4	-22°19.6
10	109°34.9	329°04.1	16°41.4	321°14.9	14°01.7	216°20.6	-22°08.1	183°19.0	-22°19.6
11	124°37.3	344°03.4	16°40.5	336°15.8	14°01.1	231°23.1	-22°08.1	198°21.6	-22°19.6
12	139°39.8	359°02.8	16°39.6	351°16.7	14°00.6	246°25.5	-22°08.1	213°24.2	-22°19.6
13	154°42.3	14°02.2	16°38.7	6°17.6	14°00.1	261°28.0	-22°08.1	228°26.9	-22°19.6
14	169°44.7	29°01.6	16°37.8	21°18.6	13°59.5	276°30.5	-22°08.1	243°29.5	-22°19.7
15	184°47.2	44°01.0	16°36.9	36°19.5	13°59.0	291°32.9	-22°08.1	258°32.1	-22°19.7
16	199°49.6	59°00.4	16°36.0	51°20.4	13°58.4	306°35.4	-22°08.1	273°34.7	-22°19.7
17	214°52.1	73°59.7	16°35.0	66°21.4	13°57.9	321°37.8	-22°08.1	288°37.3	-22°19.7
18	229°54.6	88°59.1	16°34.1	81°22.3	13°57.4	336°40.3	-22°08.1	303°39.9	-22°19.7
19	244°57.0	103°58.5	16°33.2	96°23.2	13°56.8	351°42.8	-22°08.1	318°42.5	-22°19.8
20	259°59.5	118°57.9	16°32.3	111°24.1	13°56.3	6°45.2	-22°08.1	333°45.1	-22°19.8
21	275°02.0	133°57.3	16°31.4	126°25.1	13°55.7	21°47.7	-22°08.2	348°47.7	-22°19.8
22	290°04.4	148°56.7	16°30.5	141°26.0	13°55.2	36°50.2	-22°08.2	3°50.3	-22°19.8
23	305°06.9	163°56.1	16°29.6	156°26.9	13°54.6	51°52.6	-22°08.2	18°53.0	-22°19.8
Mer.pass.:2:42:		v-0.6 d-0.9 m-3.8		v0.9 d-0.5 m1.7		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	320°09.4	178°55.4	16°28.7	171°27.9	13°54.1	66°55.1	-22°08.2	33°55.6	-22°19.9
1	335°11.8	193°54.8	16°27.8	186°28.8	13°53.5	81°57.5	-22°08.2	48°58.2	-22°19.9
2	350°14.3	208°54.2	16°26.9	201°29.7	13°53.0	97°00.0	-22°08.2	64°00.8	-22°19.9
3	5°16.8	223°53.6	16°26.0	216°30.6	13°52.5	112°02.5	-22°08.2	79°03.4	-22°19.9
4	20°19.2	238°53.0	16°25.0	231°31.6	13°51.9	127°04.9	-22°08.2	94°06.0	-22°19.9
5	35°21.7	253°52.4	16°24.1	246°32.5	13°51.4	142°07.4	-22°08.2	109°08.6	-22°19.9
6	50°24.1	268°51.8	16°23.2	261°33.4	13°50.8	157°09.9	-22°08.2	124°11.2	-22°20.0
7	65°26.6	283°51.2	16°22.3	276°34.4	13°50.3	172°12.3	-22°08.2	139°13.8	-22°20.0
8	80°29.1	298°50.6	16°21.4	291°35.3	13°49.7	187°14.8	-22°08.2	154°16.4	-22°20.0
9	95°31.5	313°50.0	16°20.5	306°36.2	13°49.2	202°17.2	-22°08.3	169°19.0	-22°20.0
10	110°34.0	328°49.3	16°19.5	321°37.1	13°48.6	217°19.7	-22°08.3	184°21.6	-22°20.0
11	125°36.5	343°48.7	16°18.6	336°38.1	13°48.1	232°22.1	-22°08.3	199°24.3	-22°20.1
12	140°38.9	358°48.1	16°17.7	351°39.0	13°47.6	247°24.6	-22°08.3	214°26.9	-22°20.1
13	155°41.4	13°47.5	16°16.8	6°39.9	13°47.0	262°27.1	-22°08.3	229°29.5	-22°20.1
14	170°43.9	28°46.9	16°15.9	21°40.9	13°46.5	277°29.5	-22°08.3	244°32.1	-22°20.1
15	185°46.3	43°46.3	16°14.9	36°41.8	13°45.9	292°32.0	-22°08.3	259°34.7	-22°20.1
16	200°48.8	58°45.7	16°14.0	51°42.7	13°45.4	307°34.4	-22°08.3	274°37.3	-22°20.2
17	215°51.2	73°45.1	16°13.1	66°43.7	13°44.8	322°36.9	-22°08.3	289°39.9	-22°20.2
18	230°53.7	88°44.5	16°12.2	81°44.6	13°44.3	337°39.3	-22°08.3	304°42.5	-22°20.2
19	245°56.2	103°43.9	16°11.2	96°45.5	13°43.7	352°41.8	-22°08.3	319°45.1	-22°20.2
20	260°58.6	118°43.3	16°10.3	111°46.4	13°43.2	7°44.2	-22°08.4	334°47.7	-22°20.2
21	276°01.1	133°42.7	16°09.4	126°47.4	13°42.6	22°46.7	-22°08.4	349°50.3	-22°20.3
22	291°03.6	148°42.1	16°08.5	141°48.3	13°42.1	37°49.2	-22°08.4	4°52.9	-22°20.3
23	306°06.0	163°41.5	16°07.5	156°49.2	13°41.5	52°51.6	-22°08.4	19°55.5	-22°20.3
Mer.pass.:2:38:		v-0.6 d-0.9 m-3.8		v0.9 d-0.5 m1.7		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	321°08.5	178°40.9	16°06.6	171°50.2	13°41.0	67°54.1	-22°08.4	34°58.1	-22°20.3
1	336°11.0	193°40.3	16°05.7	186°51.1	13°40.4	82°56.5	-22°08.4	50°00.8	-22°20.3
2	351°13.4	208°39.7	16°04.7	201°52.0	13°39.9	97°59.0	-22°08.4	65°03.4	-22°20.3
3	6°15.9	223°39.1	16°03.8	216°53.0	13°39.3	113°01.4	-22°08.4	80°06.0	-22°20.4
4	21°18.4	238°38.5	16°02.9	231°53.9	13°38.8	128°03.9	-22°08.4	95°08.6	-22°20.4
5	36°20.8	253°37.9	16°01.9	246°54.8	13°38.2	143°06.3	-22°08.4	110°11.2	-22°20.4
6	51°23.3	268°37.3	16°01.0	261°55.8	13°37.7	158°08.8	-22°08.4	125°13.8	-22°20.4
7	66°25.7	283°36.7	16°00.1	276°56.7	13°37.2	173°11.2	-22°08.5	140°16.4	-22°20.4
8	81°28.2	298°36.1	15°59.1	291°57.6	13°36.6	188°13.7	-22°08.5	155°19.0	-22°20.5
9	96°30.7	313°35.5	15°58.2	306°58.6	13°36.1	203°16.1	-22°08.5	170°21.6	-22°20.5
10	111°33.1	328°34.9	15°57.3	321°59.5	13°35.5	218°18.6	-22°08.5	185°24.2	-22°20.5
11	126°35.6	343°34.3	15°56.3	337°00.4	13°35.0	233°21.0	-22°08.5	200°26.8	-22°20.5
12	141°38.1	358°33.7	15°55.4	352°01.4	13°34.4	248°23.5	-22°08.5	215°29.4	-22°20.5
13	156°40.5	13°33.1	15°54.4	7°02.3	13°33.9	263°25.9	-22°08.5	230°32.0	-22°20.6
14	171°43.0	28°32.5	15°53.5	22°03.2	13°33.3	278°28.4	-22°08.5	245°34.6	-22°20.6
15	186°45.5	43°31.9	15°52.6	37°04.2	13°32.8	293°30.8	-22°08.5	260°37.2	-22°20.6
16	201°47.9	58°31.3	15°51.6	52°05.1	13°32.2	308°33.3	-22°08.5	275°39.8	-22°20.6
17	216°50.4	73°30.7	15°50.7	67°06.0	13°31.7	323°35.7	-22°08.5	290°42.4	-22°20.6
18	231°52.9	88°30.1	15°49.7	82°07.0	13°31.1	338°38.2	-22°08.6	305°45.0	-22°20.6
19	246°55.3	103°29.5	15°48.8	97°07.9	13°30.6	353°40.6	-22°08.6	320°47.6	-22°20.7
20	261°57.8	118°28.9	15°47.8	112°08.8	13°30.0	8°43.1	-22°08.6	335°50.2	-22°20.7
21	277°00.2	133°28.4	15°46.9	127°09.8	13°29.5	23°45.5	-22°08.6	350°52.8	-22°20.7
22	292°02.7	148°27.8	15°46.0	142°10.7	13°28.9	38°48.0	-22°08.6	5°55.4	-22°20.7
23	307°05.2	163°27.2	15°45.0	157°11.6	13°28.4	53°50.4	-22°08.6	20°58.1	-22°20.7
Mer.pass.:2:35:		v-0.6 d-0.9 m-3.8		v0.9 d-0.5 m1.7		v2.5 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Stars

Star	SHA	Dec
Alpheratz	357°38.9	29°11.8
Ankaa	353°11.2	-42°11.8
Schedar	349°35.4	56°38.4
Diphda	348°51.3	-17°52.7
Achernar	335°23.4	-57°08.1
Hamal	327°55.9	23°33.1
Polaris	315°54.2	89°20.4
Akamar	315°15.1	-40°13.4
Menkar	314°10.6	4°09.9
Mirfak	308°34.3	49°55.5
Aldebaran	290°44.7	16°32.8
Rigel	281°08.2	-8°10.7
Capella	280°28.5	46°00.8
Bellatrix	278°27.7	6°22.0
Elnath	278°07.5	28°37.3
Alnilam	275°42.3	-1°11.4
Betelgeuse	270°57.0	7°24.6
Canopus	263°54.7	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.5	5°10.6
Pollux	243°22.8	27°58.7
Avior	234°17.0	-59°34.2
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.1	-63°12.5
Gacrux	171°56.6	-57°13.4
Alioth	166°17.3	55°51.6
Spica	158°26.9	-11°15.6
Alcaid	152°55.7	49°13.4
Hadar	148°42.1	-60°28.1
Menkent	148°02.7	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.1	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.2	74°05.0
Alphecca	126°07.4	26°39.3
Antares	112°20.9	-26°28.4
Atria	107°18.7	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°15.9	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°43.8	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.0	-56°40.2
Deneb	49°28.2	45°21.1
Enif	33°42.7	9°58.0
Alnair	27°38.0	-46°51.8
Fomalhaut	15°19.0	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.8	15°18.6

2019/8/1	SHA	Mer.pass
Venus	220°00.1	12:04
Mars	211°55.4	12:35
Jupiter	106°45.7	19:33
Saturn	73°42.7	21:45

2019/8/1	SHA	Mer.pass
Venus	218°46.1	12:05
Mars	211°18.5	12:33
Jupiter	106°45.7	19:29
Saturn	73°46.2	21:41

2019/8/1	SHA	Mer.pass
Venus	217°32.4	12:06
Mars	210°41.7	12:32
Jupiter	106°45.6	19:25
Saturn	73°49.6	21:36

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°39.9	15°24.8	51°52.7	9.8	-21°37.6	-3.3	55.8
1	193°40.0	15°24.1	66°21.6	9.8	-21°40.8	-3.2	55.8
2	208°40.1	15°23.3	80°50.4	9.8	-21°43.9	-3.0	55.7
3	223°40.2	15°22.6	95°19.3	9.8	-21°46.9	-2.9	55.7
4	238°40.3	15°21.9	109°48.1	9.8	-21°49.8	-2.8	55.7
5	253°40.4	15°21.1	124°16.9	9.8	-21°52.6	-2.7	55.7
6	268°40.5	15°20.4	138°45.8	9.8	-21°55.2	-2.6	55.6
7	283°40.6	15°19.7	153°14.6	9.9	-21°57.7	-2.5	55.6
8	298°40.7	15°18.9	167°43.5	9.9	-22°00.2	-2.4	55.6
9	313°40.8	15°18.2	182°12.4	9.9	-22°02.5	-2.2	55.6
10	328°40.9	15°17.4	196°41.2	9.9	-22°04.6	-2.1	55.6
11	343°41.0	15°16.7	211°10.1	9.9	-22°06.7	-2.0	55.5
12	358°41.1	15°16.0	225°39.0	9.9	-22°08.6	-1.9	55.5
13	13°41.2	15°15.2	240°07.9	9.9	-22°10.5	-1.8	55.5
14	28°41.3	15°14.5	254°36.8	9.9	-22°12.2	-1.7	55.5
15	43°41.4	15°13.7	269°05.7	9.9	-22°13.8	-1.5	55.4
16	58°41.5	15°13.0	283°34.6	9.9	-22°15.3	-1.4	55.4
17	73°41.6	15°12.2	298°03.5	9.9	-22°16.6	-1.3	55.4
18	88°41.7	15°11.5	312°32.4	9.9	-22°17.9	-1.2	55.4
19	103°41.8	15°10.8	327°01.4	10.0	-22°19.0	-1.1	55.4
20	118°41.9	15°10.0	341°30.3	10.0	-22°20.1	-1.0	55.3
21	133°42.0	15°09.3	355°59.3	10.0	-22°21.0	-0.8	55.3
22	148°42.1	15°08.5	10°28.3	10.0	-22°21.8	-0.7	55.3
23	163°42.2	15°07.8	24°57.3	10.0	-22°22.4	-0.6	55.3
	SD.=15.8	d=-0.7			S.D.=15.2		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°42.3	15°07.0	39°26.3	10.0	-22°23.0	-0.5	55.3
1	193°42.4	15°06.3	53°55.4	10.0	-22°23.4	-0.4	55.2
2	208°42.6	15°05.5	68°24.4	10.1	-22°23.8	-0.3	55.2
3	223°42.7	15°04.8	82°53.5	10.1	-22°24.0	-0.2	55.2
4	238°42.8	15°04.0	97°22.6	10.1	-22°24.1	-0.0	55.2
5	253°42.9	15°03.3	111°51.7	10.1	-22°24.1	0.1	55.2
6	268°43.0	15°02.6	126°20.8	10.1	-22°23.9	0.2	55.2
7	283°43.1	15°01.8	140°50.0	10.2	-22°23.7	0.3	55.1
8	298°43.2	15°01.1	155°19.2	10.2	-22°23.3	0.4	55.1
9	313°43.3	15°00.3	169°48.4	10.2	-22°22.9	0.5	55.1
10	328°43.4	14°59.6	184°17.6	10.2	-22°22.3	0.6	55.1
11	343°43.5	14°58.8	198°46.8	10.3	-22°21.6	0.8	55.1
12	358°43.6	14°58.1	213°16.1	10.3	-22°20.8	0.9	55.0
13	13°43.7	14°57.3	227°45.4	10.3	-22°19.9	1.0	55.0
14	28°43.8	14°56.6	242°14.7	10.3	-22°18.8	1.1	55.0
15	43°43.9	14°55.8	256°44.1	10.4	-22°17.7	1.2	55.0
16	58°44.0	14°55.0	271°13.4	10.4	-22°16.4	1.3	55.0
17	73°44.1	14°54.3	285°42.8	10.4	-22°15.1	1.4	55.0
18	88°44.2	14°53.5	300°12.3	10.4	-22°13.6	1.5	54.9
19	103°44.4	14°52.8	314°41.7	10.5	-22°12.0	1.6	54.9
20	118°44.5	14°52.0	329°11.2	10.5	-22°10.3	1.8	54.9
21	133°44.6	14°51.3	343°40.7	10.5	-22°08.5	1.9	54.9
22	148°44.7	14°50.5	358°10.3	10.6	-22°06.6	2.0	54.9
23	163°44.8	14°49.8	12°39.9	10.6	-22°04.6	2.1	54.9
	SD.=15.8	d=-0.7			S.D.=15.1		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°44.9	14°49.0	27°09.5	10.6	-22°02.4	2.2	54.8
1	193°45.0	14°48.3	41°39.2	10.7	-22°00.2	2.3	54.8
2	208°45.1	14°47.5	56°08.8	10.7	-21°57.8	2.4	54.8
3	223°45.2	14°46.7	70°38.6	10.7	-21°55.4	2.5	54.8
4	238°45.3	14°46.0	85°08.3	10.8	-21°52.8	2.6	54.8
5	253°45.4	14°45.2	99°38.1	10.8	-21°50.2	2.7	54.8
6	268°45.6	14°44.5	114°08.0	10.8	-21°47.4	2.8	54.8
7	283°45.7	14°43.7	128°37.8	10.9	-21°44.5	2.9	54.7
8	298°45.8	14°43.0	143°07.7	10.9	-21°41.5	3.0	54.7
9	313°45.9	14°42.2	157°37.7	11.0	-21°38.4	3.1	54.7
10	328°46.0	14°41.4	172°07.7	11.0	-21°35.2	3.2	54.7
11	343°46.1	14°40.7	186°37.7	11.0	-21°31.9	3.4	54.7
12	358°46.2	14°39.9	201°07.7	11.1	-21°28.5	3.5	54.7
13	13°46.3	14°39.2	215°37.8	11.1	-21°25.0	3.6	54.7
14	28°46.5	14°38.4	230°08.0	11.2	-21°21.4	3.7	54.6
15	43°46.6	14°37.6	244°38.2	11.2	-21°17.7	3.8	54.6
16	58°46.7	14°36.9	259°08.4	11.2	-21°13.9	3.9	54.6
17	73°46.8	14°36.1	273°38.7	11.3	-21°10.0	4.0	54.6
18	88°46.9	14°35.3	288°09.0	11.3	-21°06.0	4.1	54.6
19	103°47.0	14°34.6	302°39.3	11.4	-21°01.9	4.2	54.6
20	118°47.1	14°33.8	317°09.7	11.4	-20°57.7	4.3	54.6
21	133°47.3	14°33.1	331°40.2	11.5	-20°53.4	4.4	54.5
22	148°47.4	14°32.3	346°10.7	11.5	-20°49.0	4.5	54.5
23	163°47.5	14°31.5	0°41.2	11.6	-20°44.5	4.5	54.5
	SD.=15.8	d=-0.8			S.D.=15.0		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	01:59	22:04	–:–	–:–
70	–:–	–:–	02:39	21:27	–:–	–:–
68	–:–	01:13	03:05	21:02	22:48	–:–
66	–:–	02:03	03:25	20:42	22:03	–:–
64	–:–	02:33	03:42	20:26	21:34	–:–
62	01:05	02:55	03:55	20:13	21:12	22:57
60	01:50	03:13	04:06	20:02	20:55	22:16
58	02:18	03:27	04:16	19:53	20:41	21:49
56	02:38	03:40	04:24	19:44	20:29	21:29
54	02:55	03:50	04:32	19:37	20:18	21:13
52	03:09	03:60	04:39	19:30	20:09	20:59
50	03:21	04:08	04:45	19:24	20:01	20:47
45	03:45	04:25	04:58	19:12	19:44	20:24
40	04:03	04:39	05:08	19:01	19:30	20:06
35	04:18	04:50	05:17	18:52	19:19	19:52
30	04:30	05:00	05:25	18:44	19:10	19:40
20	04:49	05:16	05:39	18:31	18:54	19:21
10	05:03	05:29	05:51	18:19	18:41	19:07
0	05:15	05:40	06:02	18:08	18:30	18:55
-10	05:26	05:51	06:13	17:58	18:19	18:45
-20	05:35	06:01	06:24	17:46	18:09	18:35
-30	05:44	06:12	06:37	17:34	17:58	18:27
-35	05:48	06:18	06:44	17:26	17:53	18:23
-40	05:52	06:24	06:53	17:18	17:46	18:18
-45	05:57	06:32	07:02	17:08	17:39	18:14
-50	06:02	06:40	07:14	16:57	17:31	18:09
-52	06:04	06:44	07:20	16:51	17:27	18:07
-54	06:06	06:48	07:26	16:45	17:23	18:05
-56	06:08	06:52	07:32	16:39	17:19	18:03
-58	06:11	06:57	07:40	16:31	17:14	18:01
-60	06:13	07:03	07:48	16:23	17:08	17:58

Lat.	Moonrise			Moonset		
	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	21:40	–:–	–:–	–:–
66	19:46	20:31	20:51	22:47	23:47	–:–
64	19:03	19:51	20:20	23:29	–:–	00:26
62	18:35	19:24	19:57	23:58	–:–	00:54
60	18:13	19:02	19:38	–:–	00:20	01:15
58	17:55	18:45	19:23	–:–	00:37	01:32
56	17:40	18:30	19:09	00:08	00:52	01:47
54	17:27	18:17	18:58	00:20	01:05	01:60
52	17:16	18:06	18:48	00:31	01:17	02:11
50	17:06	17:56	18:39	00:40	01:27	02:21
45	16:45	17:36	18:19	01:00	01:48	02:41
40	16:28	17:19	18:04	01:16	02:05	02:58
35	16:13	17:04	17:50	01:30	02:19	03:12
30	16:01	16:52	17:39	01:42	02:32	03:24
20	15:40	16:31	17:19	02:03	02:53	03:45
10	15:21	16:13	17:02	02:21	03:12	04:03
0	15:04	15:55	16:45	02:37	03:29	04:20
-10	14:47	15:38	16:29	02:54	03:46	04:36
-20	14:29	15:20	16:12	03:12	04:05	04:54
-30	14:08	14:59	15:52	03:33	04:26	05:15
-35	13:56	14:46	15:40	03:45	04:38	05:27
-40	13:41	14:32	15:27	03:59	04:53	05:41
-45	13:25	14:15	15:11	04:15	05:10	05:57
-50	13:04	13:54	14:51	04:35	05:31	06:17
-52	12:54	13:45	14:42	04:45	05:40	06:27
-54	12:43	13:33	14:31	04:56	05:52	06:37
-56	12:31	13:21	14:19	05:08	06:04	06:49
-58	12:16	13:06	14:06	05:23	06:19	07:03
-60	11:59	12:48	13:50	05:40	06:37	07:20

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
11	05:20	05:15	12:05	21:16	08:50	10(86%)
12	05:11	05:06	12:05	22:07	09:42	11(92%)
13	05:00	04:55	12:04	22:57	10:32	12(96%)

August 14, 15 ,16 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	322°07.6	178°26.6	15°44.1	172°12.6	13°27.8	68°52.8	-22°08.6	36°00.7	-22°20.8
1	337°10.1	193°26.0	15°43.1	187°13.5	13°27.3	83°55.3	-22°08.6	51°03.3	-22°20.8
2	352°12.6	208°25.4	15°42.2	202°14.4	13°26.7	98°57.7	-22°08.6	66°05.9	-22°20.8
3	7°15.0	223°24.8	15°41.2	217°15.4	13°26.1	114°00.2	-22°08.6	81°08.5	-22°20.8
4	22°17.5	238°24.2	15°40.3	232°16.3	13°25.6	129°02.6	-22°08.7	96°11.1	-22°20.8
5	37°20.0	253°23.6	15°39.3	247°17.2	13°25.0	144°05.1	-22°08.7	111°13.7	-22°20.9
6	52°22.4	268°23.1	15°38.4	262°18.2	13°24.5	159°07.5	-22°08.7	126°16.3	-22°20.9
7	67°24.9	283°22.5	15°37.4	277°19.1	13°23.9	174°10.0	-22°08.7	141°18.9	-22°20.9
8	82°27.4	298°21.9	15°36.4	292°20.0	13°23.4	189°12.4	-22°08.7	156°21.5	-22°20.9
9	97°29.8	313°21.3	15°35.5	307°21.0	13°22.8	204°14.8	-22°08.7	171°24.1	-22°20.9
10	112°32.3	328°20.7	15°34.5	322°21.9	13°22.3	219°17.3	-22°08.7	186°26.7	-22°20.9
11	127°34.7	343°20.1	15°33.6	337°22.8	13°21.7	234°19.7	-22°08.7	201°29.3	-22°21.0
12	142°37.2	358°19.5	15°32.6	352°23.8	13°21.2	249°22.2	-22°08.7	216°31.9	-22°21.0
13	157°39.7	13°19.0	15°31.7	7°24.7	13°20.6	264°24.6	-22°08.7	231°34.5	-22°21.0
14	172°42.1	28°18.4	15°30.7	22°25.6	13°20.1	279°27.0	-22°08.8	246°37.1	-22°21.0
15	187°44.6	43°17.8	15°29.8	37°26.6	13°19.5	294°29.5	-22°08.8	261°39.7	-22°21.0
16	202°47.1	58°17.2	15°28.8	52°27.5	13°19.0	309°31.9	-22°08.8	276°42.3	-22°21.1
17	217°49.5	73°16.6	15°27.8	67°28.4	13°18.4	324°34.4	-22°08.8	291°44.9	-22°21.1
18	232°52.0	88°16.0	15°26.9	82°29.4	13°17.9	339°36.8	-22°08.8	306°47.5	-22°21.1
19	247°54.5	103°15.5	15°25.9	97°30.3	13°17.3	354°39.2	-22°08.8	321°50.1	-22°21.1
20	262°56.9	118°14.9	15°24.9	112°31.3	13°16.8	9°41.7	-22°08.8	336°52.7	-22°21.1
21	277°59.4	133°14.3	15°24.0	127°32.2	13°16.2	24°44.1	-22°08.8	351°55.3	-22°21.1
22	293°01.8	148°13.7	15°23.0	142°33.1	13°15.6	39°46.6	-22°08.8	6°57.9	-22°21.2
23	308°04.3	163°13.1	15°22.1	157°34.1	13°15.1	54°49.0	-22°08.9	22°00.5	-22°21.2
Mer.pass.:2:31:		v-0.6 d-0.9 m-3.8		v0.9 d-0.6 m1.7		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	323°06.8	178°12.6	15°21.1	172°35.0	13°14.5	69°51.4	-22°08.9	37°03.1	-22°21.2
1	338°09.2	193°12.0	15°20.1	187°35.9	13°14.0	84°53.9	-22°08.9	52°05.7	-22°21.2
2	353°11.7	208°11.4	15°19.2	202°36.9	13°13.4	99°56.3	-22°08.9	67°08.3	-22°21.2
3	8°14.2	223°10.8	15°18.2	217°37.8	13°12.9	114°58.7	-22°08.9	82°10.9	-22°21.3
4	23°16.6	238°10.2	15°17.2	232°38.7	13°12.3	130°01.2	-22°08.9	97°13.5	-22°21.3
5	38°19.1	253°09.7	15°16.2	247°39.7	13°11.8	145°03.6	-22°08.9	112°16.1	-22°21.3
6	53°21.6	268°09.1	15°15.3	262°40.6	13°11.2	160°06.0	-22°08.9	127°18.7	-22°21.3
7	68°24.0	283°08.5	15°14.3	277°41.6	13°10.6	175°08.5	-22°08.9	142°21.3	-22°21.3
8	83°26.5	298°07.9	15°13.3	292°42.5	13°10.1	190°10.9	-22°09.0	157°23.9	-22°21.3
9	98°29.0	313°07.4	15°12.4	307°43.4	13°09.5	205°13.3	-22°09.0	172°26.5	-22°21.4
10	113°31.4	328°06.8	15°11.4	322°44.4	13°09.0	220°15.8	-22°09.0	187°29.1	-22°21.4
11	128°33.9	343°06.2	15°10.4	337°45.3	13°08.4	235°18.2	-22°09.0	202°31.7	-22°21.4
12	143°36.3	358°05.6	15°09.4	352°46.2	13°07.9	250°20.6	-22°09.0	217°34.3	-22°21.4
13	158°38.8	13°05.1	15°08.5	7°47.2	13°07.3	265°23.1	-22°09.0	232°36.9	-22°21.4
14	173°41.3	28°04.5	15°07.5	22°48.1	13°06.8	280°25.5	-22°09.0	247°39.5	-22°21.5
15	188°43.7	43°03.9	15°06.5	37°49.1	13°06.2	295°27.9	-22°09.0	262°42.1	-22°21.5
16	203°46.2	58°03.4	15°05.5	52°50.0	13°05.6	310°30.4	-22°09.0	277°44.7	-22°21.5
17	218°48.7	73°02.8	15°04.6	67°50.9	13°05.1	325°32.8	-22°09.1	292°47.3	-22°21.5
18	233°51.1	88°02.2	15°03.6	82°51.9	13°04.5	340°35.2	-22°09.1	307°49.9	-22°21.5
19	248°53.6	103°01.6	15°02.6	97°52.8	13°04.0	355°37.7	-22°09.1	322°52.5	-22°21.5
20	263°56.1	118°01.1	15°01.6	112°53.7	13°03.4	10°40.1	-22°09.1	337°55.1	-22°21.6
21	278°58.5	133°00.5	15°00.6	127°54.7	13°02.9	25°42.5	-22°09.1	352°57.7	-22°21.6
22	294°01.0	147°59.9	14°59.7	142°55.6	13°02.3	40°45.0	-22°09.1	8°00.3	-22°21.6
23	309°03.5	162°59.4	14°58.7	157°56.6	13°01.7	55°47.4	-22°09.1	23°02.8	-22°21.6
Mer.pass.:2:27:		v-0.6 d-1.0 m-3.8		v0.9 d-0.6 m1.7		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	324°05.9	177°58.8	14°57.7	172°57.5	13°01.2	70°49.8	-22°09.1	38°05.4	-22°21.6
1	339°08.4	192°58.2	14°56.7	187°58.4	13°00.6	85°52.2	-22°09.1	53°08.0	-22°21.7
2	354°10.8	207°57.7	14°55.7	202°59.4	13°00.1	100°54.7	-22°09.2	68°10.6	-22°21.7
3	9°13.3	222°57.1	14°54.7	218°00.3	12°59.5	115°57.1	-22°09.2	83°13.2	-22°21.7
4	24°15.8	237°56.5	14°53.8	233°01.3	12°58.9	130°59.5	-22°09.2	98°15.8	-22°21.7
5	39°18.2	252°56.0	14°52.8	248°02.2	12°58.4	146°01.9	-22°09.2	113°18.4	-22°21.7
6	54°20.7	267°55.4	14°51.8	263°03.1	12°57.8	161°04.4	-22°09.2	128°21.0	-22°21.7
7	69°23.2	282°54.8	14°50.8	278°04.1	12°57.3	176°06.8	-22°09.2	143°23.6	-22°21.8
8	84°25.6	297°54.3	14°49.8	293°05.0	12°56.7	191°09.2	-22°09.2	158°26.2	-22°21.8
9	99°28.1	312°53.7	14°48.8	308°06.0	12°56.2	206°11.7	-22°09.2	173°28.8	-22°21.8
10	114°30.6	327°53.1	14°47.8	323°06.9	12°55.6	221°14.1	-22°09.3	188°31.4	-22°21.8
11	129°33.0	342°52.6	14°46.8	338°07.8	12°55.0	236°16.5	-22°09.3	203°34.0	-22°21.8
12	144°35.5	357°52.0	14°45.8	353°08.8	12°54.5	251°18.9	-22°09.3	218°36.6	-22°21.9
13	159°37.9	12°51.4	14°44.8	8°09.7	12°53.9	266°21.4	-22°09.3	233°39.2	-22°21.9
14	174°40.4	27°50.9	14°43.9	23°10.7	12°53.4	281°23.8	-22°09.3	248°41.8	-22°21.9
15	189°42.9	42°50.3	14°42.9	38°11.6	12°52.8	296°26.2	-22°09.3	263°44.4	-22°21.9
16	204°45.3	57°49.8	14°41.9	53°12.5	12°52.2	311°28.6	-22°09.3	278°47.0	-22°21.9
17	219°47.8	72°49.2	14°40.9	68°13.5	12°51.7	326°31.0	-22°09.3	293°49.6	-22°21.9
18	234°50.3	87°48.6	14°39.9	83°14.4	12°51.1	341°33.5	-22°09.4	308°52.2	-22°22.0
19	249°52.7	102°48.1	14°38.9	98°15.4	12°50.6	356°35.9	-22°09.4	323°54.8	-22°22.0
20	264°55.2	117°47.5	14°37.9	113°16.3	12°50.0	11°38.3	-22°09.4	338°57.4	-22°22.0
21	279°57.7	132°47.0	14°36.9	128°17.2	12°49.4	26°40.7	-22°09.4	353°59.9	-22°22.0
22	295°00.1	147°46.4	14°35.9	143°18.2	12°48.9	41°43.2	-22°09.4	9°02.5	-22°22.0
23	310°02.6	162°45.8	14°34.9	158°19.1	12°48.3	56°45.6	-22°09.4	24°05.1	-22°22.0
Mer.pass.:2:23:		v-0.6 d-1.0 m-3.8		v0.9 d-0.6 m1.7		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Stars

	SHA	Dec
Alpheratz	357°38.9	29°11.8
Ankaa	353°11.2	-42°11.8
Schedar	349°35.3	56°38.4
Diphda	348°51.3	-17°52.7
Achernar	335°23.3	-57°08.1
Hamal	327°55.9	23°33.2
Polaris	315°52.7	89°20.4
Akamar	315°15.1	-40°13.4
Menkar	314°10.6	4°09.9
Mirfak	308°34.3	49°55.5
Aldebaran	290°44.6	16°32.8
Rigel	281°08.1	-8°10.7
Capella	280°28.4	46°00.8
Bellatrix	278°27.6	6°22.0
Elnath	278°07.5	28°37.3
Alnilam	275°42.3	-1°11.4
Betelgeuse	270°56.9	7°24.6
Canopus	263°54.7	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.5	5°10.7
Pollux	243°22.8	27°58.7
Avior	234°17.0	-59°34.2
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°39.0
Denebola	182°29.5	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.1	-63°12.5
Gacrux	171°56.6	-57°13.4
Alioth	166°17.3	55°51.6
Spica	158°27.0	-11°15.6
Alcaid	152°55.7	49°13.4
Hadar	148°42.1	-60°28.1
Menkent	148°02.7	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.1	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.2	74°05.0
Alphecca	126°07.4	26°39.3
Antares	112°21.0	-26°28.4
Atria	107°18.7	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°16.0	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°43.8	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.3
Peacock	53°12.0	-56°40.3
Deneb	49°28.2	45°21.1
Enif	33°42.7	9°58.0
Alnair	27°38.0	-46°51.8
Fomalhaut	15°19.0	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.8	15°18.6

2019/8/1	SHA	Mer.pass
Venus	216°18.9	12:07
Mars	210°04.9	12:30
Jupiter	106°45.2	19:21
Saturn	73°53.0	21:32

2019/8/1	SHA	Mer.pass
Venus	215°05.8	12:08
Mars	209°28.2	12:29
Jupiter	106°44.7	19:17
Saturn	73°56.3	21:28

2019/8/1	SHA	Mer.pass
Venus	213°52.9	12:09
Mars	208°51.6	12:27
Jupiter	106°43.9	19:14
Saturn	73°59.5	21:24

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°47.6	14°30.8	15°11.8	11.6	-20°39.9	4.6	54.5
1	193°47.7	14°30.0	29°42.4	11.6	-20°35.2	4.7	54.5
2	208°47.8	14°29.2	44°13.1	11.7	-20°30.4	4.8	54.5
3	223°47.9	14°28.5	58°43.8	11.7	-20°25.5	4.9	54.5
4	238°48.1	14°27.7	73°14.5	11.8	-20°20.5	5.0	54.5
5	253°48.2	14°26.9	87°45.3	11.8	-20°15.5	5.1	54.4
6	268°48.3	14°26.2	102°16.2	11.9	-20°10.3	5.2	54.4
7	283°48.4	14°25.4	116°47.1	11.9	-20°05.0	5.3	54.4
8	298°48.5	14°24.6	131°18.1	12.0	-19°59.7	5.4	54.4
9	313°48.6	14°23.9	145°49.1	12.0	-19°54.2	5.5	54.4
10	328°48.8	14°23.1	160°20.1	12.1	-19°48.7	5.6	54.4
11	343°48.9	14°22.3	174°51.2	12.1	-19°43.1	5.7	54.4
12	358°49.0	14°21.5	189°22.3	12.2	-19°37.4	5.8	54.4
13	13°49.1	14°20.8	203°53.5	12.2	-19°31.6	5.8	54.4
14	28°49.2	14°20.0	218°24.8	12.3	-19°25.7	5.9	54.3
15	43°49.3	14°19.2	232°56.1	12.3	-19°19.8	6.0	54.3
16	58°49.5	14°18.5	247°27.4	12.4	-19°13.7	6.1	54.3
17	73°49.6	14°17.7	261°58.8	12.4	-19°07.6	6.2	54.3
18	88°49.7	14°16.9	276°30.2	12.5	-19°01.3	6.3	54.3
19	103°49.8	14°16.1	291°01.7	12.5	-18°55.0	6.4	54.3
20	118°49.9	14°15.4	305°33.3	12.6	-18°48.6	6.4	54.3
21	133°50.1	14°14.6	320°04.9	12.6	-18°42.2	6.5	54.3
22	148°50.2	14°13.8	334°36.5	12.7	-18°35.6	6.6	54.3
23	163°50.3	14°13.0	349°08.2	12.7	-18°29.0	6.7	54.3
	SD.=15.8	d=-0.8			S.D.=14.9		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°50.4	14°12.3	3°39.9	12.8	-18°22.2	6.8	54.3
1	193°50.5	14°11.5	18°11.7	12.8	-18°15.4	6.8	54.2
2	208°50.7	14°10.7	32°43.5	12.9	-18°08.6	6.9	54.2
3	223°50.8	14°09.9	47°15.4	12.9	-18°01.6	7.0	54.2
4	238°50.9	14°09.2	61°47.4	13.0	-17°54.6	7.1	54.2
5	253°51.0	14°08.4	76°19.4	13.0	-17°47.4	7.2	54.2
6	268°51.2	14°07.6	90°51.4	13.1	-17°40.3	7.2	54.2
7	283°51.3	14°06.8	105°23.5	13.1	-17°33.0	7.3	54.2
8	298°51.4	14°06.1	119°55.6	13.2	-17°25.6	7.4	54.2
9	313°51.5	14°05.3	134°27.8	13.2	-17°18.2	7.5	54.2
10	328°51.6	14°04.5	149°00.0	13.3	-17°10.7	7.5	54.2
11	343°51.8	14°03.7	163°32.3	13.3	-17°03.2	7.6	54.2
12	358°51.9	14°02.9	178°04.7	13.4	-16°55.5	7.7	54.2
13	13°52.0	14°02.2	192°37.0	13.4	-16°47.8	7.7	54.1
14	28°52.1	14°01.4	207°09.5	13.5	-16°40.1	7.8	54.1
15	43°52.3	14°00.6	221°42.0	13.5	-16°32.2	7.9	54.1
16	58°52.4	13°59.8	236°14.5	13.6	-16°24.3	8.0	54.1
17	73°52.5	13°59.0	250°47.1	13.6	-16°16.3	8.0	54.1
18	88°52.6	13°58.3	265°19.7	13.7	-16°08.2	8.1	54.1
19	103°52.8	13°57.5	279°52.4	13.7	-16°00.1	8.2	54.1
20	118°52.9	13°56.7	294°25.1	13.7	-15°51.9	8.2	54.1
21	133°53.0	13°55.9	308°57.9	13.8	-15°43.7	8.3	54.1
22	148°53.1	13°55.1	323°30.7	13.8	-15°35.4	8.4	54.1
23	163°53.3	13°54.3	338°03.5	13.9	-15°27.0	8.4	54.1
	SD.=15.8	d=-0.8			S.D.=14.8		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°53.4	13°53.6	352°36.4	13.9	-15°18.5	8.5	54.1
1	193°53.5	13°52.8	7°09.4	14.0	-15°10.0	8.5	54.1
2	208°53.6	13°52.0	21°42.4	14.0	-15°01.4	8.6	54.1
3	223°53.8	13°51.2	36°15.5	14.1	-14°52.8	8.7	54.1
4	238°53.9	13°50.4	50°48.6	14.1	-14°44.1	8.7	54.1
5	253°54.0	13°49.6	65°21.7	14.2	-14°35.4	8.8	54.0
6	268°54.2	13°48.8	79°54.9	14.2	-14°26.6	8.8	54.0
7	283°54.3	13°48.1	94°28.1	14.3	-14°17.7	8.9	54.0
8	298°54.4	13°47.3	109°01.4	14.3	-14°08.7	9.0	54.0
9	313°54.5	13°46.5	123°34.7	14.3	-13°59.8	9.0	54.0
10	328°54.7	13°45.7	138°08.1	14.4	-13°50.7	9.1	54.0
11	343°54.8	13°44.9	152°41.5	14.4	-13°41.6	9.1	54.0
12	358°54.9	13°44.1	167°14.9	14.5	-13°32.5	9.2	54.0
13	13°55.1	13°43.3	181°48.4	14.5	-13°23.3	9.2	54.0
14	28°55.2	13°42.5	196°22.0	14.6	-13°14.0	9.3	54.0
15	43°55.3	13°41.8	210°55.5	14.6	-13°04.7	9.3	54.0
16	58°55.4	13°41.0	225°29.1	14.6	-12°55.3	9.4	54.0
17	73°55.6	13°40.2	240°02.8	14.7	-12°45.9	9.4	54.0
18	88°55.7	13°39.4	254°36.5	14.7	-12°36.4	9.5	54.0
19	103°55.8	13°38.6	269°10.2	14.8	-12°26.9	9.5	54.0
20	118°56.0	13°37.8	283°44.0	14.8	-12°17.3	9.6	54.0
21	133°56.1	13°37.0	298°17.8	14.8	-12°07.7	9.6	54.0
22	148°56.2	13°36.2	312°51.7	14.9	-11°58.0	9.7	54.0
23	163°56.4	13°35.4	327°25.6	14.9	-11°48.3	9.7	54.0
	SD.=15.8	d=-0.8			S.D.=14.8		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:22	21:41	–:–	–:–
70	–:–	–:–	02:55	21:10	–:–	–:–
68	–:–	01:41	03:18	20:48	22:21	–:–
66	–:–	02:19	03:36	20:30	21:45	–:–
64	–:–	02:46	03:51	20:16	21:20	–:–
62	01:30	03:06	04:03	20:04	21:01	22:33
60	02:04	03:22	04:13	19:54	20:45	22:01
58	02:29	03:35	04:22	19:45	20:32	21:37
56	02:48	03:47	04:30	19:38	20:21	21:19
54	03:03	03:56	04:37	19:31	20:11	21:04
52	03:16	04:05	04:43	19:25	20:03	20:51
50	03:27	04:13	04:49	19:19	19:55	20:40
45	03:50	04:29	05:01	19:07	19:39	20:18
40	04:07	04:42	05:11	18:57	19:26	20:01
35	04:21	04:53	05:20	18:49	19:16	19:48
30	04:32	05:02	05:27	18:41	19:07	19:36
20	04:50	05:17	05:40	18:29	18:52	19:19
10	05:04	05:29	05:51	18:18	18:40	19:05
0	05:15	05:40	06:01	18:08	18:29	18:54
-10	05:25	05:50	06:11	17:58	18:20	18:44
-20	05:33	05:59	06:22	17:47	18:10	18:36
-30	05:41	06:09	06:34	17:35	18:00	18:28
-35	05:45	06:15	06:41	17:29	17:55	18:25
-40	05:49	06:21	06:49	17:21	17:49	18:21
-45	05:53	06:27	06:58	17:12	17:42	18:17
-50	05:57	06:35	07:09	17:01	17:35	18:13
-52	05:59	06:38	07:14	16:56	17:31	18:11
-54	06:00	06:42	07:19	16:50	17:28	18:10
-56	06:02	06:46	07:26	16:44	17:24	18:08
-58	06:04	06:51	07:32	16:37	17:19	18:06
-60	06:06	06:55	07:40	16:30	17:15	18:04

Lat.	**Moonrise**			**Moonset**		
	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	22:24	21:53	–:–	–:–	02:53
70	22:14	21:48	21:33	–:–	01:27	03:28
68	21:29	21:22	21:16	00:22	02:11	03:53
66	20:59	21:02	21:03	01:10	02:41	04:12
64	20:36	20:46	20:52	01:40	03:03	04:27
62	20:18	20:33	20:43	02:03	03:20	04:39
60	20:03	20:21	20:35	02:22	03:35	04:50
58	19:51	20:11	20:28	02:37	03:47	04:59
56	19:40	20:03	20:21	02:50	03:57	05:07
54	19:30	19:55	20:16	03:01	04:07	05:15
52	19:21	19:48	20:11	03:11	04:15	05:21
50	19:13	19:42	20:06	03:20	04:23	05:27
45	18:57	19:28	19:56	03:39	04:38	05:39
40	18:43	19:17	19:47	03:54	04:51	05:50
35	18:31	19:07	19:40	04:07	05:02	05:58
30	18:21	18:59	19:34	04:18	05:12	06:06
20	18:03	18:44	19:23	04:37	05:28	06:19
10	17:48	18:32	19:13	04:53	05:43	06:31
0	17:34	18:20	19:04	05:09	05:56	06:41
-10	17:19	18:08	18:55	05:24	06:09	06:52
-20	17:04	17:55	18:45	05:41	06:23	07:03
-30	16:46	17:40	18:33	05:59	06:40	07:16
-35	16:35	17:31	18:27	06:10	06:49	07:23
-40	16:24	17:21	18:20	06:23	06:59	07:32
-45	16:09	17:10	18:11	06:37	07:12	07:41
-50	15:52	16:56	18:00	06:55	07:27	07:53
-52	15:44	16:49	17:55	07:04	07:34	07:59
-54	15:35	16:42	17:50	07:13	07:42	08:05
-56	15:25	16:34	17:44	07:24	07:50	08:11
-58	15:13	16:25	17:37	07:36	08:00	08:19
-60	14:60	16:14	17:30	07:50	08:11	08:27

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
14	04:50	04:44	12:04	23:44	11:21	13(99%)
15	04:38	04:32	12:04	00:30	12:07	14(100%)
16	04:26	04:20	12:04	00:30	12:52	15(99%)

August 17, 18 ,19 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	325°05.1	177°45.3	14°33.9	173°20.1	12°47.7	71°48.0	-22°09.4	39°07.7	-22°22.1
1	340°07.5	192°44.7	14°32.9	188°21.0	12°47.2	86°50.4	-22°09.4	54°10.3	-22°22.1
2	355°10.0	207°44.2	14°31.9	203°22.0	12°46.6	101°52.8	-22°09.4	69°12.9	-22°22.1
3	10°12.4	222°43.6	14°30.9	218°22.9	12°46.1	116°55.3	-22°09.5	84°15.5	-22°22.1
4	25°14.9	237°43.1	14°29.9	233°23.8	12°45.5	131°57.7	-22°09.5	99°18.1	-22°22.1
5	40°17.4	252°42.5	14°28.9	248°24.8	12°44.9	147°00.1	-22°09.5	114°20.7	-22°22.1
6	55°19.8	267°42.0	14°27.9	263°25.7	12°44.4	162°02.5	-22°09.5	129°23.3	-22°22.2
7	70°22.3	282°41.4	14°26.9	278°26.7	12°43.8	177°04.9	-22°09.5	144°25.9	-22°22.2
8	85°24.8	297°40.8	14°25.9	293°27.6	12°43.3	192°07.3	-22°09.5	159°28.5	-22°22.2
9	100°27.2	312°40.3	14°24.9	308°28.5	12°42.7	207°09.8	-22°09.5	174°31.1	-22°22.2
10	115°29.7	327°39.7	14°23.9	323°29.5	12°42.1	222°12.2	-22°09.6	189°33.7	-22°22.2
11	130°32.2	342°39.2	14°22.8	338°30.4	12°41.6	237°14.6	-22°09.6	204°36.2	-22°22.3
12	145°34.6	357°38.6	14°21.8	353°31.4	12°41.0	252°17.0	-22°09.6	219°38.8	-22°22.3
13	160°37.1	12°38.1	14°20.8	8°32.3	12°40.4	267°19.4	-22°09.6	234°41.4	-22°22.3
14	175°39.5	27°37.5	14°19.8	23°33.3	12°39.9	282°21.8	-22°09.6	249°44.0	-22°22.3
15	190°42.0	42°37.0	14°18.8	38°34.2	12°39.3	297°24.3	-22°09.6	264°46.6	-22°22.3
16	205°44.5	57°36.4	14°17.8	53°35.1	12°38.7	312°26.7	-22°09.6	279°49.2	-22°22.3
17	220°46.9	72°35.9	14°16.8	68°36.1	12°38.2	327°29.1	-22°09.6	294°51.8	-22°22.4
18	235°49.4	87°35.3	14°15.8	83°37.0	12°37.6	342°31.5	-22°09.7	309°54.4	-22°22.4
19	250°51.9	102°34.8	14°14.8	98°38.0	12°37.1	357°33.9	-22°09.7	324°57.0	-22°22.4
20	265°54.3	117°34.2	14°13.7	113°38.9	12°36.5	12°36.3	-22°09.7	339°59.6	-22°22.4
21	280°56.8	132°33.7	14°12.7	128°39.9	12°35.9	27°38.7	-22°09.7	355°02.2	-22°22.4
22	295°59.3	147°33.1	14°11.7	143°40.8	12°35.4	42°41.2	-22°09.7	10°04.7	-22°22.4
23	311°01.7	162°32.6	14°10.7	158°41.7	12°34.8	57°43.6	-22°09.7	25°07.3	-22°22.5
Mer.pass.:2:19:		v-0.6 d-1.0 m-3.8		v0.9 d-0.6 m1.7		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	326°04.2	177°32.0	14°09.7	173°42.7	12°34.2	72°46.0	-22°09.7	40°09.9	-22°22.5
1	341°06.7	192°31.5	14°08.7	188°43.6	12°33.7	87°48.4	-22°09.7	55°12.5	-22°22.5
2	356°09.1	207°31.0	14°07.6	203°44.6	12°33.1	102°50.8	-22°09.8	70°15.1	-22°22.5
3	11°11.6	222°30.4	14°06.6	218°45.5	12°32.5	117°53.2	-22°09.8	85°17.7	-22°22.5
4	26°14.0	237°29.9	14°05.6	233°46.5	12°32.0	132°55.6	-22°09.8	100°20.3	-22°22.5
5	41°16.5	252°29.3	14°04.6	248°47.4	12°31.4	147°58.0	-22°09.8	115°22.9	-22°22.6
6	56°19.0	267°28.8	14°03.6	263°48.4	12°30.8	163°00.5	-22°09.8	130°25.5	-22°22.6
7	71°21.4	282°28.2	14°02.6	278°49.3	12°30.3	178°02.9	-22°09.8	145°28.1	-22°22.6
8	86°23.9	297°27.7	14°01.5	293°50.2	12°29.7	193°05.3	-22°09.8	160°30.6	-22°22.6
9	101°26.4	312°27.1	14°00.5	308°51.2	12°29.1	208°07.7	-22°09.9	175°33.2	-22°22.6
10	116°28.8	327°26.6	13°59.5	323°52.1	12°28.6	223°10.1	-22°09.9	190°35.8	-22°22.6
11	131°31.3	342°26.1	13°58.5	338°53.1	12°28.0	238°12.5	-22°09.9	205°38.4	-22°22.7
12	146°33.8	357°25.5	13°57.4	353°54.0	12°27.4	253°14.9	-22°09.9	220°41.0	-22°22.7
13	161°36.2	12°25.0	13°56.4	8°55.0	12°26.9	268°17.3	-22°09.9	235°43.6	-22°22.7
14	176°38.7	27°24.4	13°55.4	23°55.9	12°26.3	283°19.7	-22°09.9	250°46.2	-22°22.7
15	191°41.2	42°23.9	13°54.4	38°56.9	12°25.7	298°22.1	-22°09.9	265°48.8	-22°22.7
16	206°43.6	57°23.4	13°53.3	53°57.8	12°25.2	313°24.5	-22°10.0	280°51.4	-22°22.7
17	221°46.1	72°22.8	13°52.3	68°58.7	12°24.6	328°26.9	-22°10.0	295°53.9	-22°22.8
18	236°48.5	87°22.3	13°51.3	83°59.7	12°24.0	343°29.3	-22°10.0	310°56.5	-22°22.8
19	251°51.0	102°21.7	13°50.2	99°00.6	12°23.5	358°31.8	-22°10.0	325°59.1	-22°22.8
20	266°53.5	117°21.2	13°49.2	114°01.6	12°22.9	13°34.2	-22°10.0	341°01.7	-22°22.8
21	281°55.9	132°20.7	13°48.2	129°02.5	12°22.3	28°36.6	-22°10.0	356°04.3	-22°22.8
22	296°58.4	147°20.1	13°47.2	144°03.5	12°21.8	43°39.0	-22°10.0	11°06.9	-22°22.8
23	312°00.9	162°19.6	13°46.1	159°04.4	12°21.2	58°41.4	-22°10.1	26°09.5	-22°22.9
Mer.pass.:2:15:		v-0.5 d-1.0 m-3.8		v0.9 d-0.6 m1.7		v2.4 d-0.0 m-2.2		v2.6 d-0.0 m0.2	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	327°03.3	177°19.1	13°45.1	174°05.4	12°20.6	73°43.8	-22°10.1	41°12.1	-22°22.9
1	342°05.8	192°18.5	13°44.1	189°06.3	12°20.1	88°46.2	-22°10.1	56°14.6	-22°22.9
2	357°08.3	207°18.0	13°43.0	204°07.3	12°19.5	103°48.6	-22°10.1	71°17.2	-22°22.9
3	12°10.7	222°17.4	13°42.0	219°08.2	12°18.9	118°51.0	-22°10.1	86°19.8	-22°22.9
4	27°13.2	237°16.9	13°41.0	234°09.2	12°18.4	133°53.4	-22°10.1	101°22.4	-22°22.9
5	42°15.6	252°16.4	13°39.9	249°10.1	12°17.8	148°55.8	-22°10.1	116°25.0	-22°23.0
6	57°18.1	267°15.8	13°38.9	264°11.0	12°17.2	163°58.2	-22°10.2	131°27.6	-22°23.0
7	72°20.6	282°15.3	13°37.8	279°12.0	12°16.7	179°00.6	-22°10.2	146°30.2	-22°23.0
8	87°23.0	297°14.8	13°36.8	294°12.9	12°16.1	194°03.0	-22°10.2	161°32.7	-22°23.0
9	102°25.5	312°14.2	13°35.8	309°13.9	12°15.5	209°05.4	-22°10.2	176°35.3	-22°23.0
10	117°28.0	327°13.7	13°34.7	324°14.8	12°15.0	224°07.8	-22°10.2	191°37.9	-22°23.0
11	132°30.4	342°13.2	13°33.7	339°15.8	12°14.4	239°10.2	-22°10.2	206°40.5	-22°23.1
12	147°32.9	357°12.6	13°32.7	354°16.7	12°13.8	254°12.6	-22°10.2	221°43.1	-22°23.1
13	162°35.4	12°12.1	13°31.6	9°17.7	12°13.2	269°15.0	-22°10.3	236°45.7	-22°23.1
14	177°37.8	27°11.6	13°30.6	24°18.6	12°12.7	284°17.4	-22°10.3	251°48.3	-22°23.1
15	192°40.3	42°11.1	13°29.5	39°19.6	12°12.1	299°19.8	-22°10.3	266°50.8	-22°23.1
16	207°42.8	57°10.5	13°28.5	54°20.5	12°11.5	314°22.2	-22°10.3	281°53.4	-22°23.1
17	222°45.2	72°10.0	13°27.4	69°21.5	12°11.0	329°24.6	-22°10.3	296°56.0	-22°23.2
18	237°47.7	87°09.5	13°26.4	84°22.4	12°10.4	344°27.0	-22°10.3	311°58.6	-22°23.2
19	252°50.1	102°08.9	13°25.4	99°23.4	12°09.8	359°29.4	-22°10.3	327°01.2	-22°23.2
20	267°52.6	117°08.4	13°24.3	114°24.3	12°09.3	14°31.8	-22°10.4	342°03.8	-22°23.2
21	282°55.1	132°07.9	13°23.3	129°25.3	12°08.7	29°34.2	-22°10.4	357°06.3	-22°23.2
22	297°57.5	147°07.4	13°22.2	144°26.2	12°08.1	44°36.6	-22°10.4	12°08.9	-22°23.2
23	312°60.0	162°06.8	13°21.2	159°27.2	12°07.5	59°39.0	-22°10.4	27°11.5	-22°23.3
Mer.pass.:2:11:		v-0.5 d-1.0 m-3.8		v0.9 d-0.6 m1.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.2	

Stars

Star	SHA	Dec
Alpheratz	357°38.8	29°11.8
Ankaa	353°11.2	-42°11.8
Schedar	349°35.3	56°38.4
Diphda	348°51.3	-17°52.7
Achernar	335°23.3	-57°08.1
Hamal	327°55.9	23°33.2
Polaris	315°51.3	89°20.4
Akamar	315°15.0	-40°13.4
Menkar	314°10.6	4°09.9
Mirfak	308°34.3	49°55.5
Aldebaran	290°44.6	16°32.8
Rigel	281°08.1	-8°10.7
Capella	280°28.4	46°00.8
Bellatrix	278°27.6	6°22.0
Elnath	278°07.5	28°37.3
Alnilam	275°42.2	-1°11.4
Betelgeuse	270°56.9	7°24.6
Canopus	263°54.6	-52°42.2
Sirius	258°30.2	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.5	5°10.7
Pollux	243°22.8	27°58.7
Avior	234°16.9	-59°34.2
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.9
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.1	-63°12.5
Gacrux	171°56.6	-57°13.4
Alioth	166°17.3	55°51.6
Spica	158°27.0	-11°15.6
Alcaid	152°55.7	49°13.4
Hadar	148°42.1	-60°28.1
Menkent	148°02.8	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.1	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.3	74°05.0
Alphecca	126°07.4	26°39.3
Antares	112°21.0	-26°28.4
Atria	107°18.8	-69°03.8
Sabik	102°07.5	-15°44.8
Shaula	96°16.0	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°43.9	51°29.5
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.0	-56°40.3
Deneb	49°28.2	45°21.2
Enif	33°42.7	9°58.0
Alnair	27°38.0	-46°51.8
Fomalhaut	15°19.0	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.8	15°18.7

2019/8/1	SHA	Mer.pass
Venus	212°40.2	12:09
Mars	208°15.0	12:26
Jupiter	106°42.9	19:10
Saturn	74°02.7	21:20

2019/8/1	SHA	Mer.pass
Venus	211°27.9	12:10
Mars	207°38.5	12:24
Jupiter	106°41.8	19:06
Saturn	74°05.7	21:16

2019/8/1	SHA	Mer.pass
Venus	210°15.7	12:11
Mars	207°02.0	12:23
Jupiter	106°40.5	19:02
Saturn	74°08.7	21:12

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°56.5	13°34.6	341°59.5	14.9	-11°38.6	9.8	54.0
1	193°56.6	13°33.8	356°33.5	15.0	-11°28.8	9.8	54.0
2	208°56.8	13°33.0	11°07.5	15.0	-11°18.9	9.9	54.0
3	223°56.9	13°32.2	25°41.5	15.1	-11°09.0	9.9	54.0
4	238°57.0	13°31.5	40°15.6	15.1	-10°59.1	10.0	54.0
5	253°57.2	13°30.7	54°49.7	15.1	-10°49.1	10.0	54.0
6	268°57.3	13°29.9	69°23.8	15.2	-10°39.1	10.0	54.0
7	283°57.4	13°29.1	83°58.0	15.2	-10°29.0	10.1	54.0
8	298°57.6	13°28.3	98°32.2	15.2	-10°18.9	10.1	54.0
9	313°57.7	13°27.5	113°06.4	15.3	-10°08.7	10.2	54.0
10	328°57.8	13°26.7	127°40.7	15.3	-9°58.5	10.2	54.0
11	343°58.0	13°25.9	142°15.0	15.3	-9°48.3	10.2	54.0
12	358°58.1	13°25.1	156°49.3	15.3	-9°38.1	10.3	54.0
13	13°58.2	13°24.3	171°23.7	15.4	-9°27.8	10.3	54.0
14	28°58.4	13°23.5	185°58.1	15.4	-9°17.4	10.4	54.0
15	43°58.5	13°22.7	200°32.5	15.4	-9°07.0	10.4	54.0
16	58°58.6	13°21.9	215°07.0	15.5	-8°56.6	10.4	54.0
17	73°58.8	13°21.1	229°41.4	15.5	-8°46.2	10.5	54.0
18	88°58.9	13°20.3	244°15.9	15.5	-8°35.7	10.5	54.0
19	103°59.0	13°19.5	258°50.5	15.5	-8°25.2	10.5	54.0
20	118°59.2	13°18.7	273°25.0	15.6	-8°14.6	10.6	54.0
21	133°59.3	13°17.9	287°59.6	15.6	-8°04.1	10.6	54.0
22	148°59.4	13°17.1	302°34.2	15.6	-7°53.4	10.6	54.0
23	163°59.6	13°16.3	317°08.9	15.6	-7°42.8	10.7	54.0
	SD.=15.8	d=-0.8			S.D.=14.7		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	178°59.7	13°15.5	331°43.5	15.7	-7°32.1	10.7	54.0
1	193°59.9	13°14.7	346°18.2	15.7	-7°21.4	10.7	54.0
2	208°60.0	13°13.9	0°52.9	15.7	-7°10.7	10.7	54.0
3	224°00.1	13°13.1	15°27.6	15.7	-6°59.9	10.8	54.0
4	239°00.3	13°12.3	30°02.3	15.7	-6°49.1	10.8	54.0
5	254°00.4	13°11.5	44°37.1	15.8	-6°38.3	10.8	54.0
6	269°00.5	13°10.7	59°11.9	15.8	-6°27.5	10.9	54.0
7	284°00.7	13°09.9	73°46.7	15.8	-6°16.6	10.9	54.0
8	299°00.8	13°09.1	88°21.5	15.8	-6°05.7	10.9	54.0
9	314°01.0	13°08.2	102°56.3	15.8	-5°54.8	10.9	54.0
10	329°01.1	13°07.4	117°31.2	15.9	-5°43.9	11.0	54.0
11	344°01.2	13°06.6	132°06.0	15.9	-5°32.9	11.0	54.0
12	359°01.4	13°05.8	146°40.9	15.9	-5°21.9	11.0	54.0
13	14°01.5	13°05.0	161°15.8	15.9	-5°10.9	11.0	54.0
14	29°01.7	13°04.2	175°50.7	15.9	-4°59.9	11.0	54.0
15	44°01.8	13°03.4	190°25.6	15.9	-4°48.8	11.1	54.0
16	59°01.9	13°02.6	205°00.5	15.9	-4°37.8	11.1	54.1
17	74°02.1	13°01.8	219°35.5	15.9	-4°26.7	11.1	54.1
18	89°02.2	13°01.0	234°10.4	16.0	-4°15.6	11.1	54.1
19	104°02.4	13°00.2	248°45.4	16.0	-4°04.4	11.1	54.1
20	119°02.5	12°59.4	263°20.4	16.0	-3°53.3	11.2	54.1
21	134°02.6	12°58.6	277°55.3	16.0	-3°42.1	11.2	54.1
22	149°02.8	12°57.7	292°30.3	16.0	-3°31.0	11.2	54.1
23	164°02.9	12°56.9	307°05.3	16.0	-3°19.8	11.2	54.1
	SD.=15.8	d=-0.8			S.D.=14.7		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°03.1	12°56.1	321°40.3	16.0	-3°08.6	11.2	54.1
1	194°03.2	12°55.3	336°15.3	16.0	-2°57.3	11.2	54.1
2	209°03.4	12°54.5	350°50.3	16.0	-2°46.1	11.2	54.1
3	224°03.5	12°53.7	5°25.3	16.0	-2°34.9	11.3	54.1
4	239°03.6	12°52.9	20°00.3	16.0	-2°23.6	11.3	54.1
5	254°03.8	12°52.1	34°35.3	16.0	-2°12.3	11.3	54.1
6	269°03.9	12°51.3	49°10.4	16.0	-2°01.0	11.3	54.1
7	284°04.1	12°50.4	63°45.4	16.0	-1°49.8	11.3	54.2
8	299°04.2	12°49.6	78°20.4	16.0	-1°38.4	11.3	54.2
9	314°04.4	12°48.8	92°55.4	16.0	-1°27.1	11.3	54.2
10	329°04.5	12°48.0	107°30.4	16.0	-1°15.8	11.3	54.2
11	344°04.6	12°47.2	122°05.4	16.0	-1°04.5	11.3	54.2
12	359°04.8	12°46.4	136°40.4	16.0	-0°53.1	11.3	54.2
13	14°04.9	12°45.6	151°15.4	16.0	-0°41.8	11.3	54.2
14	29°05.1	12°44.7	165°50.4	16.0	-0°30.5	11.4	54.2
15	44°05.2	12°43.9	180°25.4	16.0	-0°19.1	11.4	54.2
16	59°05.4	12°43.1	195°00.4	16.0	-0°07.7	11.4	54.2
17	74°05.5	12°42.3	209°35.3	16.0	0°03.6	11.4	54.3
18	89°05.7	12°41.5	224°10.3	16.0	0°15.0	11.4	54.3
19	104°05.8	12°40.7	238°45.3	15.9	0°26.4	11.4	54.3
20	119°06.0	12°39.8	253°20.2	15.9	0°37.7	11.4	54.3
21	134°06.1	12°39.0	267°55.1	15.9	0°49.1	11.4	54.3
22	149°06.2	12°38.2	282°30.0	15.9	1°00.5	11.4	54.3
23	164°06.4	12°37.4	297°05.0	15.9	1°11.8	11.4	54.3
	SD.=15.8	d=-0.8			S.D.=14.8		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	02:42	21:21	–:–	–:–
70	–:–	01:09	03:10	20:54	22:48	–:–
68	–:–	02:03	03:31	20:34	21:59	–:–
66	–:–	02:35	03:47	20:19	21:29	–:–
64	01:01	02:58	04:00	20:06	21:07	22:57
62	01:49	03:16	04:11	19:55	20:50	22:14
60	02:18	03:30	04:21	19:46	20:35	21:46
58	02:39	03:43	04:29	19:37	20:23	21:26
56	02:56	03:53	04:36	19:30	20:13	21:09
54	03:11	04:03	04:43	19:24	20:04	20:55
52	03:23	04:11	04:48	19:18	19:56	20:43
50	03:33	04:18	04:54	19:13	19:49	20:33
45	03:54	04:33	05:05	19:02	19:34	20:12
40	04:10	04:45	05:14	18:53	19:22	19:57
35	04:23	04:55	05:22	18:45	19:12	19:44
30	04:34	05:04	05:29	18:38	19:03	19:33
20	04:51	05:18	05:41	18:27	18:50	19:16
10	05:04	05:29	05:51	18:17	18:38	19:03
0	05:15	05:39	06:01	18:07	18:28	18:53
-10	05:24	05:48	06:10	17:58	18:19	18:44
-20	05:31	05:57	06:20	17:48	18:11	18:37
-30	05:38	06:07	06:31	17:37	18:02	18:30
-35	05:42	06:12	06:37	17:31	17:57	18:26
-40	05:45	06:17	06:45	17:24	17:51	18:23
-45	05:48	06:23	06:53	17:15	17:46	18:20
-50	05:52	06:30	07:03	17:05	17:39	18:17
-52	05:53	06:33	07:08	17:01	17:36	18:15
-54	05:55	06:36	07:13	16:56	17:33	18:14
-56	05:56	06:40	07:19	16:50	17:29	18:13
-58	05:58	06:44	07:25	16:44	17:25	18:11
-60	05:59	06:48	07:32	16:37	17:21	18:10

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	21:32	21:15	20:59	04:55	06:43	08:27
70	21:21	21:10	21:00	05:14	06:53	08:29
68	21:11	21:06	21:01	05:28	07:01	08:31
66	21:03	21:03	21:02	05:40	07:07	08:33
64	20:56	20:60	21:02	05:50	07:13	08:34
62	20:51	20:57	21:03	05:59	07:17	08:35
60	20:45	20:55	21:03	06:06	07:21	08:36
58	20:41	20:53	21:04	06:12	07:25	08:37
56	20:37	20:51	21:04	06:18	07:28	08:38
54	20:33	20:49	21:04	06:23	07:31	08:39
52	20:30	20:48	21:05	06:27	07:33	08:39
50	20:27	20:46	21:05	06:31	07:36	08:40
45	20:20	20:43	21:06	06:40	07:41	08:41
40	20:15	20:41	21:06	06:47	07:45	08:42
35	20:10	20:39	21:07	06:54	07:49	08:43
30	20:06	20:37	21:07	06:59	07:52	08:44
20	19:59	20:33	21:08	07:09	07:57	08:45
10	19:52	20:31	21:08	07:17	08:02	08:47
0	19:46	20:28	21:09	07:24	08:06	08:48
-10	19:40	20:25	21:10	07:32	08:11	08:49
-20	19:34	20:22	21:10	07:40	08:15	08:50
-30	19:26	20:19	21:11	07:49	08:21	08:51
-35	19:22	20:17	21:11	07:55	08:24	08:52
-40	19:17	20:15	21:12	08:01	08:27	08:53
-45	19:12	20:12	21:13	08:07	08:31	08:54
-50	19:05	20:09	21:13	08:16	08:36	08:55
-52	19:02	20:08	21:14	08:19	08:38	08:55
-54	18:58	20:06	21:14	08:24	08:40	08:56
-56	18:54	20:04	21:14	08:28	08:43	08:56
-58	18:50	20:02	21:15	08:33	08:46	08:57
-60	18:45	20:00	21:15	08:39	08:49	08:58

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
17	04:14	04:08	12:04	01:14	13:35	16(96%)
18	04:01	03:54	12:03	01:56	14:17	17(92%)
19	03:48	03:41	12:03	02:37	14:58	18(86%)

August 20, 21 ,22 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	328°02.5	177°06.3	13°20.1	174°28.1	12°07.0	74°41.4	-22°10.4	42°14.1	-22°23.3
1	343°04.9	192°05.8	13°19.1	189°29.1	12°06.4	89°43.8	-22°10.4	57°16.7	-22°23.3
2	358°07.4	207°05.3	13°18.0	204°30.0	12°05.8	104°46.2	-22°10.4	72°19.3	-22°23.3
3	13°09.9	222°04.7	13°17.0	219°30.9	12°05.3	119°48.6	-22°10.5	87°21.8	-22°23.3
4	28°12.3	237°04.2	13°15.9	234°31.9	12°04.7	134°51.0	-22°10.5	102°24.4	-22°23.3
5	43°14.8	252°03.7	13°14.9	249°32.8	12°04.1	149°53.3	-22°10.5	117°27.0	-22°23.4
6	58°17.2	267°03.2	13°13.8	264°33.8	12°03.5	164°55.7	-22°10.5	132°29.6	-22°23.4
7	73°19.7	282°02.6	13°12.8	279°34.7	12°03.0	179°58.1	-22°10.5	147°32.2	-22°23.4
8	88°22.2	297°02.1	13°11.7	294°35.7	12°02.4	195°00.5	-22°10.5	162°34.8	-22°23.4
9	103°24.6	312°01.6	13°10.7	309°36.6	12°01.8	210°02.9	-22°10.6	177°37.3	-22°23.4
10	118°27.1	327°01.1	13°09.6	324°37.6	12°01.2	225°05.3	-22°10.6	192°39.9	-22°23.4
11	133°29.6	342°00.5	13°08.6	339°38.5	12°00.7	240°07.7	-22°10.6	207°42.5	-22°23.5
12	148°32.0	357°00.0	13°07.5	354°39.5	12°00.1	255°10.1	-22°10.6	222°45.1	-22°23.5
13	163°34.5	11°59.5	13°06.4	9°40.4	11°59.5	270°12.5	-22°10.6	237°47.7	-22°23.5
14	178°37.0	26°59.0	13°05.4	24°41.4	11°59.0	285°14.9	-22°10.6	252°50.2	-22°23.5
15	193°39.4	41°58.5	13°04.3	39°42.3	11°58.4	300°17.3	-22°10.6	267°52.8	-22°23.5
16	208°41.9	56°57.9	13°03.3	54°43.3	11°57.8	315°19.7	-22°10.7	282°55.4	-22°23.5
17	223°44.4	71°57.4	13°02.2	69°44.2	11°57.2	330°22.1	-22°10.7	297°58.0	-22°23.6
18	238°46.8	86°56.9	13°01.2	84°45.2	11°56.7	345°24.4	-22°10.7	313°00.6	-22°23.6
19	253°49.3	101°56.4	13°00.1	99°46.1	11°56.1	0°26.8	-22°10.7	328°03.1	-22°23.6
20	268°51.7	116°55.9	12°59.0	114°47.1	11°55.5	15°29.2	-22°10.7	343°05.7	-22°23.6
21	283°54.2	131°55.4	12°58.0	129°48.0	11°54.9	30°31.6	-22°10.7	358°08.3	-22°23.6
22	298°56.7	146°54.8	12°56.9	144°49.0	11°54.4	45°34.0	-22°10.8	13°10.9	-22°23.6
23	313°59.1	161°54.3	12°55.9	159°49.9	11°53.8	60°36.4	-22°10.8	28°13.5	-22°23.7
Mer.pass.:2:07:		v-0.5 d-1.0 m-3.8		v0.9 d-0.6 m1.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	329°01.6	176°53.8	12°54.8	174°50.9	11°53.2	75°38.8	-22°10.8	43°16.0	-22°23.7
1	344°04.1	191°53.3	12°53.7	189°51.8	11°52.6	90°41.2	-22°10.8	58°18.6	-22°23.7
2	359°06.5	206°52.8	12°52.7	204°52.8	11°52.1	105°43.5	-22°10.8	73°21.2	-22°23.7
3	14°09.0	221°52.3	12°51.6	219°53.7	11°51.5	120°45.9	-22°10.8	88°23.8	-22°23.7
4	29°11.5	236°51.7	12°50.5	234°54.7	11°50.9	135°48.3	-22°10.8	103°26.4	-22°23.7
5	44°13.9	251°51.2	12°49.5	249°55.6	11°50.3	150°50.7	-22°10.9	118°28.9	-22°23.7
6	59°16.4	266°50.7	12°48.4	264°56.6	11°49.8	165°53.1	-22°10.9	133°31.5	-22°23.8
7	74°18.8	281°50.2	12°47.3	279°57.5	11°49.2	180°55.5	-22°10.9	148°34.1	-22°23.8
8	89°21.3	296°49.7	12°46.3	294°58.5	11°48.6	195°57.9	-22°10.9	163°36.7	-22°23.8
9	104°23.8	311°49.2	12°45.2	309°59.5	11°48.0	211°00.2	-22°10.9	178°39.3	-22°23.8
10	119°26.2	326°48.7	12°44.1	325°00.4	11°47.5	226°02.6	-22°10.9	193°41.8	-22°23.8
11	134°28.7	341°48.2	12°43.1	340°01.4	11°46.9	241°05.0	-22°11.0	208°44.4	-22°23.8
12	149°31.2	356°47.6	12°42.0	355°02.3	11°46.3	256°07.4	-22°11.0	223°47.0	-22°23.9
13	164°33.6	11°47.1	12°40.9	10°03.3	11°45.7	271°09.8	-22°11.0	238°49.6	-22°23.9
14	179°36.1	26°46.6	12°39.9	25°04.2	11°45.2	286°12.2	-22°11.0	253°52.2	-22°23.9
15	194°38.6	41°46.1	12°38.8	40°05.2	11°44.6	301°14.5	-22°11.0	268°54.7	-22°23.9
16	209°41.0	56°45.6	12°37.7	55°06.1	11°44.0	316°16.9	-22°11.0	283°57.3	-22°23.9
17	224°43.5	71°45.1	12°36.6	70°07.1	11°43.4	331°19.3	-22°11.1	298°59.9	-22°23.9
18	239°46.0	86°44.6	12°35.6	85°08.0	11°42.9	346°21.7	-22°11.1	314°02.5	-22°24.0
19	254°48.4	101°44.1	12°34.5	100°09.0	11°42.3	1°24.1	-22°11.1	329°05.0	-22°24.0
20	269°50.9	116°43.6	12°33.4	115°09.9	11°41.7	16°26.5	-22°11.1	344°07.6	-22°24.0
21	284°53.3	131°43.1	12°32.3	130°10.9	11°41.1	31°28.8	-22°11.1	359°10.2	-22°24.0
22	299°55.8	146°42.5	12°31.3	145°11.8	11°40.6	46°31.2	-22°11.1	14°12.8	-22°24.0
23	314°58.3	161°42.0	12°30.2	160°12.8	11°40.0	61°33.6	-22°11.2	29°15.3	-22°24.0
Mer.pass.:2:03:		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	330°00.7	176°41.5	12°29.1	175°13.7	11°39.4	76°36.0	-22°11.2	44°17.9	-22°24.0
1	345°03.2	191°41.0	12°28.0	190°14.7	11°38.8	91°38.4	-22°11.2	59°20.5	-22°24.1
2	0°05.7	206°40.5	12°27.0	205°15.6	11°38.2	106°40.7	-22°11.2	74°23.1	-22°24.1
3	15°08.1	221°40.0	12°25.9	220°16.6	11°37.7	121°43.1	-22°11.2	89°25.6	-22°24.1
4	30°10.6	236°39.5	12°24.8	235°17.5	11°37.1	136°45.5	-22°11.2	104°28.2	-22°24.1
5	45°13.1	251°39.0	12°23.7	250°18.5	11°36.5	151°47.9	-22°11.3	119°30.8	-22°24.1
6	60°15.5	266°38.5	12°22.6	265°19.4	11°35.9	166°50.2	-22°11.3	134°33.4	-22°24.1
7	75°18.0	281°38.0	12°21.6	280°20.4	11°35.4	181°52.6	-22°11.3	149°36.0	-22°24.2
8	90°20.5	296°37.5	12°20.5	295°21.4	11°34.8	196°55.0	-22°11.3	164°38.5	-22°24.2
9	105°22.9	311°37.0	12°19.4	310°22.3	11°34.2	211°57.4	-22°11.3	179°41.1	-22°24.2
10	120°25.4	326°36.5	12°18.3	325°23.3	11°33.6	226°59.8	-22°11.3	194°43.7	-22°24.2
11	135°27.8	341°36.0	12°17.2	340°24.2	11°33.0	242°02.1	-22°11.4	209°46.3	-22°24.2
12	150°30.3	356°35.5	12°16.1	355°25.2	11°32.5	257°04.5	-22°11.4	224°48.8	-22°24.2
13	165°32.8	11°35.0	12°15.1	10°26.1	11°31.9	272°06.9	-22°11.4	239°51.4	-22°24.2
14	180°35.2	26°34.5	12°14.0	25°27.1	11°31.3	287°09.3	-22°11.4	254°54.0	-22°24.3
15	195°37.7	41°34.0	12°12.9	40°28.0	11°30.7	302°11.6	-22°11.4	269°56.5	-22°24.3
16	210°40.2	56°33.5	12°11.8	55°29.0	11°30.1	317°14.0	-22°11.4	284°59.1	-22°24.3
17	225°42.6	71°33.0	12°10.7	70°29.9	11°29.6	332°16.4	-22°11.5	300°01.7	-22°24.3
18	240°45.1	86°32.5	12°09.6	85°30.9	11°29.0	347°18.8	-22°11.5	315°04.3	-22°24.3
19	255°47.6	101°32.0	12°08.5	100°31.8	11°28.4	2°21.1	-22°11.5	330°06.8	-22°24.3
20	270°50.0	116°31.5	12°07.5	115°32.8	11°27.8	17°23.5	-22°11.5	345°09.4	-22°24.4
21	285°52.5	131°31.0	12°06.4	130°33.8	11°27.2	32°25.9	-22°11.5	0°12.0	-22°24.4
22	300°54.9	146°30.5	12°05.3	145°34.7	11°26.7	47°28.2	-22°11.5	15°14.6	-22°24.4
23	315°57.4	161°30.0	12°04.2	160°35.7	11°26.1	62°30.6	-22°11.6	30°17.1	-22°24.4
Mer.pass.:1:59:		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.2	-42°11.8
Schedar	349°35.3	56°38.5
Diphda	348°51.3	-17°52.7
Achernar	335°23.3	-57°08.1
Hamal	327°55.9	23°33.2
Polaris	315°49.9	89°20.4
Akamar	315°15.0	-40°13.4
Menkar	314°10.6	4°10.0
Mirfak	308°34.2	49°55.5
Aldebaran	290°44.6	16°32.8
Rigel	281°08.1	-8°10.7
Capella	280°28.4	46°00.8
Bellatrix	278°27.6	6°22.0
Elnath	278°07.4	28°37.3
Alnilam	275°42.2	-1°11.4
Betelgeuse	270°56.9	7°24.6
Canopus	263°54.6	-52°42.2
Sirius	258°30.1	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.5	5°10.7
Pollux	243°22.8	27°58.7
Avior	234°16.9	-59°34.2
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.8
Alphard	217°52.3	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.9
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.2	-63°12.5
Gacrux	171°56.7	-57°13.4
Alioth	166°17.4	55°51.6
Spica	158°27.0	-11°15.6
Alcaid	152°55.8	49°13.3
Hadar	148°42.2	-60°28.1
Menkent	148°02.8	-36°27.9
Arcturus	145°51.8	19°05.5
Rigil Kent.	139°46.2	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.3	74°04.9
Alphecca	126°07.4	26°39.3
Antares	112°21.0	-26°28.4
Atria	107°18.8	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.0	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°43.9	51°29.6
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.8	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.0	-56°40.3
Deneb	49°28.2	45°21.2
Enif	33°42.7	9°58.0
Alnair	27°38.0	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.8	15°18.7

2019/8/2	**SHA**	**Mer.pass**
Venus	209°03.8	12:12
Mars	206°25.6	12:21
Jupiter	106°38.9	18:58
Saturn	74°11.6	21:07

2019/8/2	**SHA**	**Mer.pass**
Venus	207°52.2	12:13
Mars	205°49.3	12:20
Jupiter	106°37.2	18:54
Saturn	74°14.4	21:03

2019/8/2	**SHA**	**Mer.pass**
Venus	206°40.8	12:14
Mars	205°13.0	12:18
Jupiter	106°35.2	18:51
Saturn	74°17.2	20:59

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°06.5	12°36.6	311°39.8	15.9	1°23.2	11.4	54.3
1	194°06.7	12°35.7	326°14.7	15.9	1°34.6	11.4	54.3
2	209°06.8	12°34.9	340°49.6	15.9	1°46.0	11.4	54.4
3	224°07.0	12°34.1	355°24.4	15.8	1°57.3	11.4	54.4
4	239°07.1	12°33.3	9°59.3	15.8	2°08.7	11.4	54.4
5	254°07.3	12°32.5	24°34.1	15.8	2°20.1	11.4	54.4
6	269°07.4	12°31.6	39°08.9	15.8	2°31.4	11.4	54.4
7	284°07.6	12°30.8	53°43.6	15.8	2°42.8	11.4	54.4
8	299°07.7	12°30.0	68°18.4	15.7	2°54.1	11.3	54.4
9	314°07.9	12°29.2	82°53.1	15.7	3°05.5	11.3	54.5
10	329°08.0	12°28.4	97°27.8	15.7	3°16.8	11.3	54.5
11	344°08.2	12°27.5	112°02.5	15.7	3°28.1	11.3	54.5
12	359°08.3	12°26.7	126°37.2	15.6	3°39.5	11.3	54.5
13	14°08.5	12°25.9	141°11.8	15.6	3°50.8	11.3	54.5
14	29°08.6	12°25.1	155°46.4	15.6	4°02.1	11.3	54.5
15	44°08.8	12°24.2	170°21.0	15.6	4°13.4	11.3	54.6
16	59°08.9	12°23.4	184°55.5	15.5	4°24.7	11.3	54.6
17	74°09.1	12°22.6	199°30.1	15.5	4°35.9	11.3	54.6
18	89°09.2	12°21.8	214°04.6	15.5	4°47.2	11.3	54.6
19	104°09.4	12°20.9	228°39.0	15.4	4°58.4	11.2	54.6
20	119°09.5	12°20.1	243°13.5	15.4	5°09.7	11.2	54.6
21	134°09.7	12°19.3	257°47.9	15.4	5°20.9	11.2	54.7
22	149°09.8	12°18.5	272°22.2	15.4	5°32.1	11.2	54.7
23	164°10.0	12°17.6	286°56.6	15.3	5°43.3	11.2	54.7
	SD.=15.8	d=-0.8			S.D.=14.8		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°10.1	12°16.8	301°30.9	15.3	5°54.4	11.2	54.7
1	194°10.3	12°16.0	316°05.1	15.2	6°05.6	11.1	54.7
2	209°10.4	12°15.1	330°39.4	15.2	6°16.7	11.1	54.7
3	224°10.6	12°14.3	345°13.6	15.2	6°27.9	11.1	54.8
4	239°10.7	12°13.5	359°47.7	15.1	6°39.0	11.1	54.8
5	254°10.9	12°12.7	14°21.8	15.1	6°50.0	11.1	54.8
6	269°11.0	12°11.8	28°55.9	15.1	7°01.1	11.0	54.8
7	284°11.2	12°11.0	43°29.9	15.0	7°12.1	11.0	54.8
8	299°11.4	12°10.2	58°03.9	15.0	7°23.2	11.0	54.9
9	314°11.5	12°09.3	72°37.9	14.9	7°34.2	11.0	54.9
10	329°11.7	12°08.5	87°11.8	14.9	7°45.1	11.0	54.9
11	344°11.8	12°07.7	101°45.6	14.8	7°56.1	10.9	54.9
12	359°12.0	12°06.8	116°19.4	14.8	8°07.0	10.9	54.9
13	14°12.1	12°06.0	130°53.2	14.7	8°17.9	10.9	55.0
14	29°12.3	12°05.2	145°26.9	14.7	8°28.8	10.9	55.0
15	44°12.4	12°04.3	160°00.6	14.6	8°39.6	10.8	55.0
16	59°12.6	12°03.5	174°34.2	14.6	8°50.4	10.8	55.0
17	74°12.7	12°02.7	189°07.8	14.5	9°01.2	10.8	55.1
18	89°12.9	12°01.9	203°41.3	14.5	9°12.0	10.7	55.1
19	104°13.1	12°01.0	218°14.8	14.4	9°22.7	10.7	55.1
20	119°13.2	12°00.2	232°48.2	14.4	9°33.4	10.7	55.1
21	134°13.4	11°59.3	247°21.6	14.3	9°44.1	10.6	55.1
22	149°13.5	11°58.5	261°54.9	14.3	9°54.7	10.6	55.2
23	164°13.7	11°57.7	276°28.1	14.2	10°05.3	10.6	55.2
	SD.=15.8	d=-0.8			S.D.=14.9		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°13.8	11°56.8	291°01.4	14.2	10°15.8	10.5	55.2
1	194°14.0	11°56.0	305°34.5	14.1	10°26.4	10.5	55.2
2	209°14.1	11°55.2	320°07.6	14.1	10°36.9	10.5	55.3
3	224°14.3	11°54.3	334°40.6	14.0	10°47.3	10.4	55.3
4	239°14.5	11°53.5	349°13.6	13.9	10°57.8	10.4	55.3
5	254°14.6	11°52.7	3°46.5	13.9	11°08.1	10.4	55.3
6	269°14.8	11°51.8	18°19.3	13.8	11°18.5	10.3	55.4
7	284°14.9	11°51.0	32°52.1	13.8	11°28.8	10.3	55.4
8	299°15.1	11°50.1	47°24.8	13.7	11°39.0	10.2	55.4
9	314°15.3	11°49.3	61°57.5	13.6	11°49.3	10.2	55.4
10	329°15.4	11°48.5	76°30.1	13.6	11°59.4	10.2	55.5
11	344°15.6	11°47.6	91°02.6	13.5	12°09.6	10.1	55.5
12	359°15.7	11°46.8	105°35.1	13.4	12°19.7	10.1	55.5
13	14°15.9	11°46.0	120°07.5	13.4	12°29.7	10.0	55.6
14	29°16.0	11°45.1	134°39.8	13.3	12°39.7	10.0	55.6
15	44°16.2	11°44.3	149°12.1	13.2	12°49.7	9.9	55.6
16	59°16.4	11°43.4	163°44.3	13.2	12°59.6	9.9	55.6
17	74°16.5	11°42.6	178°16.4	13.1	13°09.4	9.8	55.7
18	89°16.7	11°41.8	192°48.4	13.0	13°19.2	9.8	55.7
19	104°16.8	11°40.9	207°20.4	12.9	13°29.0	9.7	55.7
20	119°17.0	11°40.1	221°52.3	12.9	13°38.7	9.7	55.7
21	134°17.2	11°39.2	236°24.2	12.8	13°48.3	9.6	55.8
22	149°17.3	11°38.4	250°55.9	12.7	13°57.9	9.6	55.8
23	164°17.5	11°37.5	265°27.6	12.6	14°07.5	9.5	55.8
	SD.=15.8	d=-0.8			S.D.=15.1		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	–:–	03:01	21:01	–:–	–:–
70	–:–	01:42	03:24	20:38	22:17	–:–
68	–:–	02:22	03:43	20:21	21:40	–:–
66	–:–	02:49	03:57	20:07	21:14	–:–
64	01:29	03:09	04:09	19:55	20:54	22:30
62	02:05	03:25	04:19	19:45	20:38	21:57
60	02:30	03:39	04:28	19:37	20:25	21:33
58	02:49	03:50	04:35	19:30	20:14	21:14
56	03:05	03:60	04:42	19:23	20:05	20:59
54	03:18	04:09	04:48	19:17	19:56	20:46
52	03:29	04:16	04:53	19:12	19:49	20:36
50	03:39	04:23	04:58	19:07	19:42	20:26
45	03:59	04:37	05:08	18:57	19:28	20:07
40	04:14	04:48	05:17	18:49	19:17	19:52
35	04:26	04:58	05:24	18:42	19:08	19:40
30	04:36	05:06	05:31	18:35	19:00	19:30
20	04:52	05:19	05:42	18:25	18:47	19:14
10	05:04	05:30	05:51	18:15	18:37	19:02
0	05:14	05:39	05:60	18:07	18:28	18:52
-10	05:22	05:47	06:09	17:58	18:19	18:44
-20	05:29	05:55	06:18	17:49	18:11	18:37
-30	05:36	06:04	06:28	17:39	18:03	18:31
-35	05:38	06:08	06:34	17:33	17:59	18:28
-40	05:41	06:13	06:41	17:26	17:54	18:26
-45	05:44	06:18	06:48	17:19	17:49	18:23
-50	05:46	06:24	06:57	17:10	17:43	18:21
-52	05:48	06:27	07:02	17:05	17:40	18:20
-54	05:49	06:30	07:06	17:01	17:37	18:19
-56	05:50	06:33	07:12	16:56	17:34	18:18
-58	05:51	06:36	07:17	16:50	17:31	18:17
-60	05:52	06:40	07:24	16:44	17:27	18:16

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	20:43	20:25	20:01	10:10	11:57	13:54
70	20:50	20:40	20:27	10:06	11:45	13:30
68	20:56	20:51	20:46	10:02	11:35	13:12
66	21:01	21:01	21:02	09:59	11:26	12:58
64	21:05	21:09	21:15	09:56	11:20	12:46
62	21:09	21:16	21:26	09:54	11:14	12:36
60	21:12	21:22	21:35	09:52	11:08	12:27
58	21:15	21:28	21:43	09:50	11:04	12:20
56	21:18	21:33	21:50	09:48	10:60	12:13
54	21:20	21:37	21:57	09:47	10:56	12:07
52	21:22	21:41	22:03	09:46	10:53	12:02
50	21:24	21:45	22:08	09:45	10:50	11:57
45	21:28	21:53	22:20	09:42	10:44	11:47
40	21:32	21:59	22:29	09:40	10:38	11:38
35	21:35	22:05	22:38	09:38	10:34	11:31
30	21:38	22:10	22:45	09:36	10:30	11:25
20	21:42	22:19	22:58	09:34	10:23	11:14
10	21:47	22:26	23:09	09:31	10:17	11:04
0	21:51	22:34	23:19	09:29	10:11	10:55
-10	21:55	22:41	23:30	09:27	10:05	10:46
-20	21:59	22:49	23:41	09:24	09:59	10:37
-30	22:04	22:58	23:54	09:21	09:53	10:26
-35	22:07	23:03	–:–	09:20	09:49	10:20
-40	22:10	23:09	–:–	09:18	09:44	10:13
-45	22:14	23:16	–:–	09:16	09:39	10:04
-50	22:18	23:25	–:–	09:13	09:33	09:55
-52	22:21	23:29	–:–	09:12	09:30	09:50
-54	22:23	23:33	–:–	09:11	09:27	09:45
-56	22:25	23:38	–:–	09:10	09:24	09:40
-58	22:28	23:43	–:–	09:08	09:20	09:33
-60	22:32	23:49	–:–	09:06	09:16	09:26

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
20	03:34	03:27	12:03	03:18	15:39	19(79%)
21	03:19	03:12	12:03	04:00	16:22	20(71%)
22	03:05	02:57	12:02	04:44	17:07	21(61%)

August 23, 24 ,25 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	330°59.9	176°29.5	12°03.1	175°36.6	11°25.5	77°33.0	-22°11.6	45°19.7	-22°24.4
1	346°02.3	191°29.0	12°02.0	190°37.6	11°24.9	92°35.4	-22°11.6	60°22.3	-22°24.4
2	1°04.8	206°28.5	12°00.9	205°38.5	11°24.3	107°37.7	-22°11.6	75°24.9	-22°24.4
3	16°07.3	221°28.0	11°59.8	220°39.5	11°23.8	122°40.1	-22°11.6	90°27.4	-22°24.5
4	31°09.7	236°27.5	11°58.7	235°40.4	11°23.2	137°42.5	-22°11.6	105°30.0	-22°24.5
5	46°12.2	251°27.0	11°57.6	250°41.4	11°22.6	152°44.8	-22°11.7	120°32.6	-22°24.5
6	61°14.7	266°26.5	11°56.5	265°42.4	11°22.0	167°47.2	-22°11.7	135°35.1	-22°24.5
7	76°17.1	281°26.0	11°55.4	280°43.3	11°21.4	182°49.6	-22°11.7	150°37.7	-22°24.5
8	91°19.6	296°25.5	11°54.3	295°44.3	11°20.9	197°51.9	-22°11.7	165°40.3	-22°24.5
9	106°22.1	311°25.0	11°53.2	310°45.2	11°20.3	212°54.3	-22°11.7	180°42.9	-22°24.5
10	121°24.5	326°24.6	11°52.1	325°46.2	11°19.7	227°56.7	-22°11.8	195°45.4	-22°24.6
11	136°27.0	341°24.1	11°51.1	340°47.1	11°19.1	242°59.1	-22°11.8	210°48.0	-22°24.6
12	151°29.4	356°23.6	11°50.0	355°48.1	11°18.5	258°01.4	-22°11.8	225°50.6	-22°24.6
13	166°31.9	11°23.1	11°48.9	10°49.0	11°17.9	273°03.8	-22°11.8	240°53.1	-22°24.6
14	181°34.4	26°22.6	11°47.8	25°50.0	11°17.4	288°06.2	-22°11.8	255°55.7	-22°24.6
15	196°36.8	41°22.1	11°46.7	40°51.0	11°16.8	303°08.5	-22°11.8	270°58.3	-22°24.6
16	211°39.3	56°21.6	11°45.6	55°51.9	11°16.2	318°10.9	-22°11.9	286°00.9	-22°24.7
17	226°41.8	71°21.1	11°44.5	70°52.9	11°15.6	333°13.3	-22°11.9	301°03.4	-22°24.7
18	241°44.2	86°20.6	11°43.4	85°53.8	11°15.0	348°15.6	-22°11.9	316°06.0	-22°24.7
19	256°46.7	101°20.1	11°42.3	100°54.8	11°14.4	3°18.0	-22°11.9	331°08.6	-22°24.7
20	271°49.2	116°19.6	11°41.2	115°55.7	11°13.9	18°20.3	-22°11.9	346°11.1	-22°24.7
21	286°51.6	131°19.2	11°40.1	130°56.7	11°13.3	33°22.7	-22°12.0	1°13.7	-22°24.7
22	301°54.1	146°18.7	11°38.9	145°57.6	11°12.7	48°25.1	-22°12.0	16°16.3	-22°24.7
23	316°56.6	161°18.2	11°37.8	160°58.6	11°12.1	63°27.4	-22°12.0	31°18.8	-22°24.8
Mer.pass.:1:55:		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	331°59.0	176°17.7	11°36.7	175°59.6	11°11.5	78°29.8	-22°12.0	46°21.4	-22°24.8
1	347°01.5	191°17.2	11°35.6	191°00.5	11°10.9	93°32.2	-22°12.0	61°24.0	-22°24.8
2	2°03.9	206°16.7	11°34.5	206°01.5	11°10.4	108°34.5	-22°12.0	76°26.5	-22°24.8
3	17°06.4	221°16.2	11°33.4	221°02.4	11°09.8	123°36.9	-22°12.1	91°29.1	-22°24.8
4	32°08.9	236°15.7	11°32.3	236°03.4	11°09.2	138°39.3	-22°12.1	106°31.7	-22°24.8
5	47°11.3	251°15.3	11°31.2	251°04.3	11°08.6	153°41.6	-22°12.1	121°34.3	-22°24.8
6	62°13.8	266°14.8	11°30.1	266°05.3	11°08.0	168°44.0	-22°12.1	136°36.8	-22°24.9
7	77°16.3	281°14.3	11°29.0	281°06.3	11°07.4	183°46.3	-22°12.1	151°39.4	-22°24.9
8	92°18.7	296°13.8	11°27.9	296°07.2	11°06.9	198°48.7	-22°12.2	166°42.0	-22°24.9
9	107°21.2	311°13.3	11°26.8	311°08.2	11°06.3	213°51.1	-22°12.2	181°44.5	-22°24.9
10	122°23.7	326°12.8	11°25.7	326°09.1	11°05.7	228°53.4	-22°12.2	196°47.1	-22°24.9
11	137°26.1	341°12.4	11°24.6	341°10.1	11°05.1	243°55.8	-22°12.2	211°49.7	-22°24.9
12	152°28.6	356°11.9	11°23.4	356°11.0	11°04.5	258°58.1	-22°12.2	226°52.2	-22°24.9
13	167°31.0	11°11.4	11°22.3	11°12.0	11°03.9	274°00.5	-22°12.2	241°54.8	-22°25.0
14	182°33.5	26°10.9	11°21.2	26°13.0	11°03.4	289°02.9	-22°12.3	256°57.4	-22°25.0
15	197°36.0	41°10.4	11°20.1	41°13.9	11°02.8	304°05.2	-22°12.3	271°59.9	-22°25.0
16	212°38.4	56°09.9	11°19.0	56°14.9	11°02.2	319°07.6	-22°12.3	287°02.5	-22°25.0
17	227°40.9	71°09.5	11°17.9	71°15.8	11°01.6	334°09.9	-22°12.3	302°05.1	-22°25.0
18	242°43.4	86°09.0	11°16.8	86°16.8	11°01.0	349°12.3	-22°12.3	317°07.6	-22°25.0
19	257°45.8	101°08.5	11°15.7	101°17.8	11°00.4	4°14.6	-22°12.4	332°10.2	-22°25.0
20	272°48.3	116°08.0	11°14.5	116°18.7	10°59.8	19°17.0	-22°12.4	347°12.8	-22°25.1
21	287°50.8	131°07.5	11°13.4	131°19.7	10°59.3	34°19.4	-22°12.4	2°15.3	-22°25.1
22	302°53.2	146°07.1	11°12.3	146°20.6	10°58.7	49°21.7	-22°12.4	17°17.9	-22°25.1
23	317°55.7	161°06.6	11°11.2	161°21.6	10°58.1	64°24.1	-22°12.4	32°20.5	-22°25.1
Mer.pass.:1:51:		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	332°58.2	176°06.1	11°10.1	176°22.5	10°57.5	79°26.4	-22°12.5	47°23.0	-22°25.1
1	348°00.6	191°05.6	11°09.0	191°23.5	10°56.9	94°28.8	-22°12.5	62°25.6	-22°25.1
2	3°03.1	206°05.1	11°07.8	206°24.5	10°56.3	109°31.1	-22°12.5	77°28.1	-22°25.1
3	18°05.5	221°04.7	11°06.7	221°25.4	10°55.7	124°33.5	-22°12.5	92°30.7	-22°25.2
4	33°08.0	236°04.2	11°05.6	236°26.4	10°55.1	139°35.8	-22°12.5	107°33.3	-22°25.2
5	48°10.5	251°03.7	11°04.5	251°27.3	10°54.6	154°38.2	-22°12.5	122°35.8	-22°25.2
6	63°12.9	266°03.2	11°03.4	266°28.3	10°54.0	169°40.6	-22°12.6	137°38.4	-22°25.2
7	78°15.4	281°02.8	11°02.2	281°29.3	10°53.4	184°42.9	-22°12.6	152°41.0	-22°25.2
8	93°17.9	296°02.3	11°01.1	296°30.2	10°52.8	199°45.3	-22°12.6	167°43.5	-22°25.2
9	108°20.3	311°01.8	10°60.0	311°31.2	10°52.2	214°47.6	-22°12.6	182°46.1	-22°25.2
10	123°22.8	326°01.3	10°58.9	326°32.1	10°51.6	229°50.0	-22°12.6	197°48.7	-22°25.3
11	138°25.3	341°00.9	10°57.7	341°33.1	10°51.0	244°52.3	-22°12.7	212°51.2	-22°25.3
12	153°27.7	356°00.4	10°56.6	356°34.1	10°50.4	259°54.7	-22°12.7	227°53.8	-22°25.3
13	168°30.2	10°59.9	10°55.5	11°35.0	10°49.9	274°57.0	-22°12.7	242°56.4	-22°25.3
14	183°32.7	25°59.4	10°54.4	26°36.0	10°49.3	289°59.4	-22°12.7	257°58.9	-22°25.3
15	198°35.1	40°59.0	10°53.2	41°36.9	10°48.7	305°01.7	-22°12.7	273°01.5	-22°25.3
16	213°37.6	55°58.5	10°52.1	56°37.9	10°48.1	320°04.1	-22°12.8	288°04.0	-22°25.3
17	228°40.0	70°58.0	10°51.0	71°38.9	10°47.5	335°06.4	-22°12.8	303°06.6	-22°25.4
18	243°42.5	85°57.5	10°49.9	86°39.8	10°46.9	350°08.8	-22°12.8	318°09.2	-22°25.4
19	258°45.0	100°57.1	10°48.7	101°40.8	10°46.3	5°11.1	-22°12.8	333°11.7	-22°25.4
20	273°47.4	115°56.6	10°47.6	116°41.7	10°45.7	20°13.5	-22°12.8	348°14.3	-22°25.4
21	288°49.9	130°56.1	10°46.5	131°42.7	10°45.2	35°15.8	-22°12.9	3°16.9	-22°25.4
22	303°52.4	145°55.7	10°45.4	146°43.7	10°44.6	50°18.2	-22°12.9	18°19.4	-22°25.4
23	318°54.8	160°55.2	10°44.2	161°44.6	10°44.0	65°20.5	-22°12.9	33°22.0	-22°25.4
Mer.pass.:1:47:		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.7		v2.4 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Stars

	SHA	Dec
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.1	-42°11.8
Schedar	349°35.3	56°38.5
Diphda	348°51.3	-17°52.7
Achernar	335°23.3	-57°08.1
Hamal	327°55.8	23°33.2
Polaris	315°48.3	89°20.4
Akamar	315°15.0	-40°13.4
Menkar	314°10.5	4°10.0
Mirfak	308°34.2	49°55.5
Aldebaran	290°44.6	16°32.8
Rigel	281°08.1	-8°10.7
Capella	280°28.4	46°00.8
Bellatrix	278°27.6	6°22.0
Elnath	278°07.4	28°37.3
Alnilam	275°42.2	-1°11.4
Betelgeuse	270°56.9	7°24.6
Canopus	263°54.6	-52°42.2
Sirius	258°30.1	-16°44.3
Adara	255°09.5	-28°59.8
Procyon	244°55.5	5°10.7
Pollux	243°22.8	27°58.7
Avior	234°16.9	-59°34.2
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.7
Alphard	217°52.2	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.9
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.2	-63°12.5
Gacrux	171°56.7	-57°13.4
Alioth	166°17.4	55°51.6
Spica	158°27.0	-11°15.6
Alcaid	152°55.8	49°13.3
Hadar	148°42.2	-60°28.1
Menkent	148°02.8	-36°27.9
Arcturus	145°51.9	19°05.5
Rigil Kent.	139°46.2	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.4	74°04.9
Alphecca	126°07.5	26°39.3
Antares	112°21.0	-26°28.4
Atria	107°18.9	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.0	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°43.9	51°29.6
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.9	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.0	-56°40.3
Deneb	49°28.2	45°21.2
Enif	33°42.7	9°58.0
Alnair	27°38.0	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.8	15°18.7

2019/8/2	SHA	Mer.pass
Venus	205°29.6	12:14
Mars	204°36.7	12:17
Jupiter	106°33.1	18:47
Saturn	74°19.8	20:55

2019/8/2	SHA	Mer.pass
Venus	204°18.7	12:15
Mars	204°00.5	12:15
Jupiter	106°30.8	18:43
Saturn	74°22.4	20:51

2019/8/2	SHA	Mer.pass
Venus	203°07.9	12:16
Mars	203°24.4	12:14
Jupiter	106°28.3	18:39
Saturn	74°24.9	20:47

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°17.6	11°36.7	279°59.2	12.6	14°17.0	9.5	55.9
1	194°17.8	11°35.9	294°30.8	12.5	14°26.4	9.4	55.9
2	209°18.0	11°35.0	309°02.2	12.4	14°35.8	9.3	55.9
3	224°18.1	11°34.2	323°33.6	12.3	14°45.1	9.3	56.0
4	239°18.3	11°33.3	338°04.9	12.3	14°54.3	9.2	56.0
5	254°18.5	11°32.5	352°36.1	12.2	15°03.5	9.2	56.0
6	269°18.6	11°31.6	7°07.3	12.1	15°12.7	9.1	56.1
7	284°18.8	11°30.8	21°38.3	12.0	15°21.8	9.0	56.1
8	299°18.9	11°29.9	36°09.3	11.9	15°30.8	9.0	56.1
9	314°19.1	11°29.1	50°40.2	11.9	15°39.7	8.9	56.1
10	329°19.3	11°28.2	65°11.1	11.8	15°48.6	8.8	56.2
11	344°19.4	11°27.4	79°41.8	11.7	15°57.4	8.8	56.2
12	359°19.6	11°26.6	94°12.4	11.6	16°06.1	8.7	56.2
13	14°19.8	11°25.7	108°43.0	11.5	16°14.8	8.6	56.3
14	29°19.9	11°24.9	123°13.5	11.4	16°23.4	8.6	56.3
15	44°20.1	11°24.0	137°43.9	11.4	16°32.0	8.5	56.3
16	59°20.3	11°23.2	152°14.2	11.3	16°40.4	8.4	56.4
17	74°20.4	11°22.3	166°44.5	11.2	16°48.8	8.4	56.4
18	89°20.6	11°21.5	181°14.6	11.1	16°57.1	8.3	56.4
19	104°20.7	11°20.6	195°44.7	11.0	17°05.4	8.2	56.5
20	119°20.9	11°19.8	210°14.6	10.9	17°13.6	8.1	56.5
21	134°21.1	11°18.9	224°44.5	10.8	17°21.7	8.1	56.5
22	149°21.2	11°18.1	239°14.3	10.8	17°29.7	8.0	56.6
23	164°21.4	11°17.2	253°44.0	10.7	17°37.6	7.9	56.6
	SD.=15.8	d=-0.8			S.D.=15.2		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°21.6	11°16.4	268°13.7	10.6	17°45.4	7.8	56.7
1	194°21.7	11°15.5	282°43.2	10.5	17°53.2	7.7	56.7
2	209°21.9	11°14.7	297°12.6	10.4	18°00.9	7.6	56.7
3	224°22.1	11°13.8	311°42.0	10.3	18°08.5	7.6	56.8
4	239°22.2	11°13.0	326°11.2	10.2	18°16.0	7.5	56.8
5	254°22.4	11°12.1	340°40.4	10.1	18°23.5	7.4	56.8
6	269°22.6	11°11.3	355°09.5	10.0	18°30.8	7.3	56.9
7	284°22.7	11°10.4	9°38.5	9.9	18°38.1	7.2	56.9
8	299°22.9	11°09.5	24°07.4	9.9	18°45.2	7.1	56.9
9	314°23.1	11°08.7	38°36.2	9.8	18°52.3	7.0	57.0
10	329°23.2	11°07.8	53°04.9	9.7	18°59.3	6.9	57.0
11	344°23.4	11°07.0	67°33.5	9.6	19°06.2	6.8	57.1
12	359°23.6	11°06.1	82°02.1	9.5	19°13.0	6.8	57.1
13	14°23.7	11°05.3	96°30.5	9.4	19°19.7	6.7	57.1
14	29°23.9	11°04.4	110°58.9	9.3	19°26.3	6.6	57.2
15	44°24.1	11°03.6	125°27.1	9.2	19°32.8	6.5	57.2
16	59°24.2	11°02.7	139°55.3	9.1	19°39.2	6.4	57.2
17	74°24.4	11°01.9	154°23.4	9.0	19°45.5	6.3	57.3
18	89°24.6	11°01.0	168°51.3	8.9	19°51.7	6.2	57.3
19	104°24.7	11°00.1	183°19.2	8.8	19°57.8	6.1	57.4
20	119°24.9	10°59.3	197°47.0	8.8	20°03.8	5.9	57.4
21	134°25.1	10°58.4	212°14.7	8.7	20°09.7	5.8	57.4
22	149°25.3	10°57.6	226°42.4	8.6	20°15.5	5.7	57.5
23	164°25.4	10°56.7	241°09.9	8.5	20°21.2	5.6	57.5
	SD.=15.8	d=-0.9			S.D.=15.5		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°25.6	10°55.9	255°37.3	8.4	20°26.8	5.5	57.5
1	194°25.8	10°55.0	270°04.7	8.3	20°32.3	5.4	57.6
2	209°25.9	10°54.1	284°31.9	8.2	20°37.6	5.3	57.6
3	224°26.1	10°53.3	298°59.1	8.1	20°42.9	5.2	57.7
4	239°26.3	10°52.4	313°26.1	8.0	20°48.0	5.1	57.7
5	254°26.4	10°51.6	327°53.1	7.9	20°53.0	5.0	57.7
6	269°26.6	10°50.7	342°20.0	7.8	20°57.9	4.8	57.8
7	284°26.8	10°49.8	356°46.8	7.8	21°02.7	4.7	57.8
8	299°27.0	10°49.0	11°13.5	7.7	21°07.3	4.6	57.9
9	314°27.1	10°48.1	25°40.2	7.6	21°11.9	4.5	57.9
10	329°27.3	10°47.3	40°06.7	7.5	21°16.3	4.4	57.9
11	344°27.5	10°46.4	54°33.2	7.4	21°20.6	4.2	58.0
12	359°27.6	10°45.5	68°59.5	7.3	21°24.8	4.1	58.0
13	14°27.8	10°44.7	83°25.8	7.2	21°28.9	4.0	58.1
14	29°28.0	10°43.8	97°52.0	7.2	21°32.8	3.9	58.1
15	44°28.2	10°42.9	112°18.1	7.1	21°36.6	3.7	58.1
16	59°28.3	10°42.1	126°44.2	7.0	21°40.3	3.6	58.2
17	74°28.5	10°41.2	141°10.1	6.9	21°43.9	3.5	58.2
18	89°28.7	10°40.4	155°36.0	6.8	21°47.3	3.4	58.3
19	104°28.8	10°39.5	170°01.8	6.7	21°50.6	3.2	58.3
20	119°29.0	10°38.6	184°27.5	6.7	21°53.7	3.1	58.3
21	134°29.2	10°37.8	198°53.1	6.6	21°56.8	3.0	58.4
22	149°29.4	10°36.9	213°18.7	6.5	21°59.7	2.8	58.4
23	164°29.5	10°36.0	227°44.1	6.4	22°02.4	2.7	58.5
	SD.=15.8	d=-0.9			S.D.=15.7		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	01:10	03:18	20:43	22:42	–:–
70	–:–	02:06	03:38	20:23	21:52	–:–
68	–:–	02:39	03:54	20:08	21:22	–:–
66	01:00	03:02	04:07	19:55	20:59	22:53
64	01:50	03:20	04:18	19:45	20:42	22:09
62	02:20	03:35	04:27	19:36	20:27	21:41
60	02:42	03:47	04:35	19:28	20:16	21:20
58	02:59	03:58	04:42	19:22	20:05	21:03
56	03:13	04:07	04:48	19:16	19:57	20:49
54	03:25	04:14	04:53	19:10	19:49	20:38
52	03:36	04:21	04:58	19:06	19:42	20:28
50	03:45	04:28	05:02	19:01	19:36	20:19
45	04:03	04:41	05:12	18:52	19:23	20:01
40	04:17	04:51	05:20	18:44	19:13	19:47
35	04:29	05:00	05:26	18:38	19:04	19:35
30	04:38	05:08	05:32	18:32	18:57	19:26
20	04:53	05:20	05:42	18:22	18:45	19:11
10	05:05	05:30	05:51	18:14	18:35	19:00
0	05:14	05:38	05:59	18:06	18:27	18:51
-10	05:21	05:46	06:07	17:58	18:19	18:44
-20	05:27	05:53	06:15	17:50	18:12	18:38
-30	05:33	06:00	06:25	17:40	18:05	18:33
-35	05:35	06:04	06:30	17:35	18:01	18:30
-40	05:37	06:09	06:36	17:29	17:57	18:28
-45	05:39	06:13	06:43	17:22	17:52	18:26
-50	05:41	06:19	06:52	17:14	17:47	18:25
-52	05:42	06:21	06:55	17:10	17:45	18:24
-54	05:42	06:23	06:60	17:06	17:42	18:24
-56	05:43	06:26	07:04	17:01	17:40	18:23
-58	05:43	06:29	07:09	16:56	17:37	18:23
-60	05:44	06:32	07:15	16:51	17:34	18:22

		Moonrise			**Moonset**	
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	19:16	–:–	–:–	16:18	–:–	–:–
70	20:08	19:15	–:–	15:27	18:07	–:–
68	20:40	20:33	20:17	14:56	16:50	19:01
66	21:04	21:11	21:29	14:33	16:12	17:49
64	21:23	21:38	22:06	14:15	15:46	17:13
62	21:39	21:59	22:32	14:00	15:26	16:47
60	21:52	22:16	22:52	13:48	15:09	16:27
58	22:03	22:30	23:09	13:37	14:55	16:10
56	22:13	22:43	23:24	13:28	14:43	15:56
54	22:22	22:53	23:36	13:20	14:33	15:44
52	22:29	23:03	23:47	13:12	14:24	15:33
50	22:36	23:12	23:57	13:06	14:15	15:23
45	22:51	23:30	–:–	12:52	13:58	15:03
40	23:04	23:45	–:–	12:40	13:44	14:47
35	23:15	23:58	–:–	12:30	13:31	14:33
30	23:24	–:–	00:09	12:22	13:21	14:21
20	23:40	–:–	00:28	12:07	13:03	14:01
10	23:54	–:–	00:45	11:54	12:47	13:43
0	–:–	00:08	01:00	11:42	12:32	13:27
-10	–:–	00:21	01:16	11:30	12:18	13:10
-20	–:–	00:36	01:33	11:17	12:02	12:52
-30	–:–	00:52	01:52	11:03	11:44	12:32
-35	00:02	01:02	02:04	10:54	11:34	12:20
-40	00:10	01:13	02:17	10:45	11:22	12:07
-45	00:21	01:26	02:33	10:33	11:08	11:50
-50	00:33	01:42	02:52	10:20	10:51	11:31
-52	00:39	01:50	03:01	10:14	10:43	11:21
-54	00:45	01:58	03:11	10:07	10:34	11:11
-56	00:52	02:08	03:23	09:59	10:24	10:59
-58	01:00	02:19	03:36	09:50	10:13	10:45
-60	01:09	02:31	03:52	09:40	10:00	10:29

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
23	02:49	02:42	12:02	05:30	17:54	22(51%)
24	02:34	02:26	12:02	06:20	18:46	23(41%)
25	02:18	02:09	12:02	07:13	19:41	24(31%)

August 26, 27 ,28 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	333°57.3	175°54.7	10°43.1	176°45.6	10°43.4	80°22.9	-22°12.9	48°24.5	-22°25.5
1	348°59.8	190°54.3	10°42.0	191°46.5	10°42.8	95°25.2	-22°12.9	63°27.1	-22°25.5
2	4°02.2	205°53.8	10°40.8	206°47.5	10°42.2	110°27.5	-22°13.0	78°29.7	-22°25.5
3	19°04.7	220°53.3	10°39.7	221°48.5	10°41.6	125°29.9	-22°13.0	93°32.2	-22°25.5
4	34°07.2	235°52.8	10°38.6	236°49.4	10°41.0	140°32.2	-22°13.0	108°34.8	-22°25.5
5	49°09.6	250°52.4	10°37.4	251°50.4	10°40.4	155°34.6	-22°13.0	123°37.3	-22°25.5
6	64°12.1	265°51.9	10°36.3	266°51.3	10°39.9	170°36.9	-22°13.0	138°39.9	-22°25.5
7	79°14.5	280°51.4	10°35.2	281°52.3	10°39.3	185°39.3	-22°13.1	153°42.5	-22°25.6
8	94°17.0	295°51.0	10°34.0	296°53.3	10°38.7	200°41.6	-22°13.1	168°45.0	-22°25.6
9	109°19.5	310°50.5	10°32.9	311°54.2	10°38.1	215°44.0	-22°13.1	183°47.6	-22°25.6
10	124°21.9	325°50.0	10°31.8	326°55.2	10°37.5	230°46.3	-22°13.1	198°50.1	-22°25.6
11	139°24.4	340°49.6	10°30.6	341°56.2	10°36.9	245°48.7	-22°13.1	213°52.7	-22°25.6
12	154°26.9	355°49.1	10°29.5	356°57.1	10°36.3	260°51.0	-22°13.2	228°55.3	-22°25.6
13	169°29.3	10°48.6	10°28.4	11°58.1	10°35.7	275°53.3	-22°13.2	243°57.8	-22°25.6
14	184°31.8	25°48.2	10°27.2	26°59.0	10°35.1	290°55.7	-22°13.2	259°00.4	-22°25.7
15	199°34.3	40°47.7	10°26.1	42°00.0	10°34.5	305°58.0	-22°13.2	274°02.9	-22°25.7
16	214°36.7	55°47.3	10°25.0	57°01.0	10°33.9	321°00.4	-22°13.2	289°05.5	-22°25.7
17	229°39.2	70°46.8	10°23.8	72°01.9	10°33.4	336°02.7	-22°13.3	304°08.1	-22°25.7
18	244°41.6	85°46.3	10°22.7	87°02.9	10°32.8	351°05.0	-22°13.3	319°10.6	-22°25.7
19	259°44.1	100°45.9	10°21.5	102°03.9	10°32.2	6°07.4	-22°13.3	334°13.2	-22°25.7
20	274°46.6	115°45.4	10°20.4	117°04.8	10°31.6	21°09.7	-22°13.3	349°15.7	-22°25.7
21	289°49.0	130°44.9	10°19.3	132°05.8	10°31.0	36°12.1	-22°13.3	4°18.3	-22°25.8
22	304°51.5	145°44.5	10°18.1	147°06.7	10°30.4	51°14.4	-22°13.4	19°20.9	-22°25.8
23	319°54.0	160°44.0	10°17.0	162°07.7	10°29.8	66°16.7	-22°13.4	34°23.4	-22°25.8
Mer.pass.:1:43:		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	334°56.4	175°43.6	10°15.8	177°08.7	10°29.2	81°19.1	-22°13.4	49°26.0	-22°25.8
1	349°58.9	190°43.1	10°14.7	192°09.6	10°28.6	96°21.4	-22°13.4	64°28.5	-22°25.8
2	5°01.4	205°42.6	10°13.6	207°10.6	10°28.0	111°23.8	-22°13.4	79°31.1	-22°25.8
3	20°03.8	220°42.2	10°12.4	222°11.6	10°27.4	126°26.1	-22°13.5	94°33.6	-22°25.8
4	35°06.3	235°41.7	10°11.3	237°12.5	10°26.8	141°28.4	-22°13.5	109°36.2	-22°25.8
5	50°08.8	250°41.2	10°10.1	252°13.5	10°26.3	156°30.8	-22°13.5	124°38.8	-22°25.9
6	65°11.2	265°40.8	10°09.0	267°14.4	10°25.7	171°33.1	-22°13.5	139°41.3	-22°25.9
7	80°13.7	280°40.3	10°07.8	282°15.4	10°25.1	186°35.5	-22°13.5	154°43.9	-22°25.9
8	95°16.1	295°39.9	10°06.7	297°16.4	10°24.5	201°37.8	-22°13.6	169°46.4	-22°25.9
9	110°18.6	310°39.4	10°05.5	312°17.3	10°23.9	216°40.1	-22°13.6	184°49.0	-22°25.9
10	125°21.1	325°39.0	10°04.4	327°18.3	10°23.3	231°42.5	-22°13.6	199°51.5	-22°25.9
11	140°23.5	340°38.5	10°03.2	342°19.3	10°22.7	246°44.8	-22°13.6	214°54.1	-22°25.9
12	155°26.0	355°38.0	10°02.1	357°20.2	10°22.1	261°47.1	-22°13.7	229°56.6	-22°26.0
13	170°28.5	10°37.6	10°01.0	12°21.2	10°21.5	276°49.5	-22°13.7	244°59.2	-22°26.0
14	185°30.9	25°37.1	9°59.8	27°22.1	10°20.9	291°51.8	-22°13.7	260°01.8	-22°26.0
15	200°33.4	40°36.7	9°58.7	42°23.1	10°20.3	306°54.1	-22°13.7	275°04.3	-22°26.0
16	215°35.9	55°36.2	9°57.5	57°24.1	10°19.7	321°56.5	-22°13.7	290°06.9	-22°26.0
17	230°38.3	70°35.8	9°56.4	72°25.0	10°19.1	336°58.8	-22°13.8	305°09.4	-22°26.0
18	245°40.8	85°35.3	9°55.2	87°26.0	10°18.5	352°01.1	-22°13.8	320°12.0	-22°26.0
19	260°43.3	100°34.8	9°54.1	102°27.0	10°17.9	7°03.5	-22°13.8	335°14.5	-22°26.0
20	275°45.7	115°34.4	9°52.9	117°27.9	10°17.4	22°05.8	-22°13.8	350°17.1	-22°26.1
21	290°48.2	130°33.9	9°51.8	132°28.9	10°16.8	37°08.1	-22°13.8	5°19.6	-22°26.1
22	305°50.6	145°33.5	9°50.6	147°29.9	10°16.2	52°10.5	-22°13.9	20°22.2	-22°26.1
23	320°53.1	160°33.0	9°49.4	162°30.8	10°15.6	67°12.8	-22°13.9	35°24.8	-22°26.1
Mer.pass.:1:39:		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	335°55.6	175°32.6	9°48.3	177°31.8	10°15.0	82°15.1	-22°13.9	50°27.3	-22°26.1
1	350°58.0	190°32.1	9°47.1	192°32.8	10°14.4	97°17.5	-22°13.9	65°29.9	-22°26.1
2	6°00.5	205°31.7	9°46.0	207°33.7	10°13.8	112°19.8	-22°13.9	80°32.4	-22°26.1
3	21°03.0	220°31.2	9°44.8	222°34.7	10°13.2	127°22.1	-22°14.0	95°35.0	-22°26.2
4	36°05.4	235°30.8	9°43.7	237°35.6	10°12.6	142°24.5	-22°14.0	110°37.5	-22°26.2
5	51°07.9	250°30.3	9°42.5	252°36.6	10°12.0	157°26.8	-22°14.0	125°40.1	-22°26.2
6	66°10.4	265°29.9	9°41.4	267°37.6	10°11.4	172°29.1	-22°14.0	140°42.6	-22°26.2
7	81°12.8	280°29.4	9°40.2	282°38.5	10°10.8	187°31.4	-22°14.1	155°45.2	-22°26.2
8	96°15.3	295°29.0	9°39.1	297°39.5	10°10.2	202°33.8	-22°14.1	170°47.7	-22°26.2
9	111°17.8	310°28.5	9°37.9	312°40.5	10°09.6	217°36.1	-22°14.1	185°50.3	-22°26.2
10	126°20.2	325°28.1	9°36.7	327°41.4	10°09.0	232°38.4	-22°14.1	200°52.8	-22°26.2
11	141°22.7	340°27.6	9°35.6	342°42.4	10°08.4	247°40.8	-22°14.1	215°55.4	-22°26.3
12	156°25.1	355°27.2	9°34.4	357°43.4	10°07.8	262°43.1	-22°14.2	230°57.9	-22°26.3
13	171°27.6	10°26.7	9°33.3	12°44.3	10°07.2	277°45.4	-22°14.2	246°00.5	-22°26.3
14	186°30.1	25°26.3	9°32.1	27°45.3	10°06.6	292°47.7	-22°14.2	261°03.0	-22°26.3
15	201°32.5	40°25.8	9°30.9	42°46.3	10°06.0	307°50.1	-22°14.2	276°05.6	-22°26.3
16	216°35.0	55°25.4	9°29.8	57°47.2	10°05.4	322°52.4	-22°14.2	291°08.1	-22°26.3
17	231°37.5	70°24.9	9°28.6	72°48.2	10°04.8	337°54.7	-22°14.3	306°10.7	-22°26.3
18	246°39.9	85°24.5	9°27.5	87°49.2	10°04.3	352°57.0	-22°14.3	321°13.2	-22°26.3
19	261°42.4	100°24.0	9°26.3	102°50.1	10°03.7	7°59.4	-22°14.3	336°15.8	-22°26.4
20	276°44.9	115°23.6	9°25.1	117°51.1	10°03.1	23°01.7	-22°14.3	351°18.3	-22°26.4
21	291°47.3	130°23.1	9°24.0	132°52.1	10°02.5	38°04.0	-22°14.4	6°20.9	-22°26.4
22	306°49.8	145°22.7	9°22.8	147°53.0	10°01.9	53°06.3	-22°14.4	21°23.5	-22°26.4
23	321°52.3	160°22.2	9°21.6	162°54.0	10°01.3	68°08.7	-22°14.4	36°26.0	-22°26.4
Mer.pass.:1:36:		v-0.5 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.6 d-0.0 m0.3	

Stars

	SHA	Dec
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.1	-42°11.9
Schedar	349°35.2	56°38.5
Diphda	348°51.3	-17°52.7
Achernar	335°23.2	-57°08.1
Hamal	327°55.8	23°33.2
Polaris	315°46.7	89°20.4
Akamar	315°15.0	-40°13.4
Menkar	314°10.5	4°10.0
Mirfak	308°34.2	49°55.5
Aldebaran	290°44.6	16°32.8
Rigel	281°08.1	-8°10.7
Capella	280°28.3	46°00.8
Bellatrix	278°27.6	6°22.0
Elnath	278°07.4	28°37.3
Alnilam	275°42.2	-1°11.4
Betelgeuse	270°56.9	7°24.6
Canopus	263°54.6	-52°42.2
Sirius	258°30.1	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.5	5°10.7
Pollux	243°22.7	27°58.7
Avior	234°16.9	-59°34.2
Suhail	222°49.8	-43°30.6
Miaplacidus	221°39.8	-69°47.7
Alphard	217°52.2	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.9
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.2	-63°12.5
Gacrux	171°56.7	-57°13.4
Alioth	166°17.4	55°51.6
Spica	158°27.0	-11°15.6
Alcaid	152°55.8	49°13.3
Hadar	148°42.2	-60°28.1
Menkent	148°02.8	-36°27.9
Arcturus	145°51.9	19°05.5
Rigil Kent.	139°46.2	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.5	74°04.9
Alphecca	126°07.5	26°39.3
Antares	112°21.0	-26°28.4
Atria	107°18.9	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.0	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°43.9	51°29.6
Kaus Aust.	83°37.9	-34°22.4
Vega	80°35.9	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.0	-56°40.3
Deneb	49°28.2	45°21.2
Enif	33°42.7	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°49.0	28°11.3
Markab	13°33.8	15°18.7

2019/8/2	SHA	Mer.pass
Venus	201°57.4	12:17
Mars	202°48.3	12:12
Jupiter	106°25.6	18:36
Saturn	74°27.2	20:43

2019/8/2	SHA	Mer.pass
Venus	200°47.1	12:17
Mars	202°12.2	12:11
Jupiter	106°22.7	18:32
Saturn	74°29.5	20:39

2019/8/2	SHA	Mer.pass
Venus	199°37.0	12:18
Mars	201°36.2	12:09
Jupiter	106°19.6	18:28
Saturn	74°31.7	20:35

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°29.7	10°35.2	242°09.5	6.4	22°05.1	2.6	58.5
1	194°29.9	10°34.3	256°34.8	6.3	22°07.6	2.4	58.5
2	209°30.1	10°33.4	271°00.1	6.2	22°09.9	2.3	58.6
3	224°30.2	10°32.6	285°25.3	6.1	22°12.2	2.2	58.6
4	239°30.4	10°31.7	299°50.4	6.1	22°14.2	2.0	58.7
5	254°30.6	10°30.8	314°15.4	6.0	22°16.2	1.9	58.7
6	269°30.8	10°30.0	328°40.4	5.9	22°18.0	1.7	58.7
7	284°30.9	10°29.1	343°05.2	5.9	22°19.6	1.6	58.8
8	299°31.1	10°28.2	357°30.1	5.8	22°21.2	1.4	58.8
9	314°31.3	10°27.4	11°54.8	5.7	22°22.5	1.3	58.9
10	329°31.5	10°26.5	26°19.5	5.7	22°23.8	1.2	58.9
11	344°31.6	10°25.6	40°44.1	5.6	22°24.8	1.0	58.9
12	359°31.8	10°24.8	55°08.7	5.5	22°25.8	0.9	59.0
13	14°32.0	10°23.9	69°33.2	5.5	22°26.6	0.7	59.0
14	29°32.2	10°23.0	83°57.6	5.4	22°27.2	0.6	59.1
15	44°32.3	10°22.1	98°22.0	5.4	22°27.7	0.4	59.1
16	59°32.5	10°21.3	112°46.4	5.3	22°28.1	0.3	59.1
17	74°32.7	10°20.4	127°10.6	5.2	22°28.3	0.1	59.2
18	89°32.9	10°19.5	141°34.8	5.2	22°28.3	-0.0	59.2
19	104°33.0	10°18.7	155°59.0	5.1	22°28.2	-0.2	59.2
20	119°33.2	10°17.8	170°23.1	5.1	22°28.0	-0.3	59.3
21	134°33.4	10°16.9	184°47.2	5.0	22°27.5	-0.5	59.3
22	149°33.6	10°16.1	199°11.2	5.0	22°27.0	-0.6	59.4
23	164°33.8	10°15.2	213°35.2	4.9	22°26.3	-0.8	59.4
	SD.=15.8	d=-0.9			S.D.=16.0		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°33.9	10°14.3	227°59.1	4.9	22°25.4	-0.9	59.4
1	194°34.1	10°13.4	242°23.0	4.9	22°24.4	-1.1	59.5
2	209°34.3	10°12.6	256°46.8	4.8	22°23.2	-1.3	59.5
3	224°34.5	10°11.7	271°10.6	4.8	22°21.9	-1.4	59.5
4	239°34.6	10°10.8	285°34.4	4.7	22°20.4	-1.6	59.6
5	254°34.8	10°09.9	299°58.1	4.7	22°18.8	-1.7	59.6
6	269°35.0	10°09.1	314°21.8	4.7	22°17.0	-1.9	59.7
7	284°35.2	10°08.2	328°45.5	4.6	22°15.0	-2.0	59.7
8	299°35.4	10°07.3	343°09.1	4.6	22°12.9	-2.2	59.7
9	314°35.5	10°06.4	357°32.7	4.6	22°10.7	-2.3	59.8
10	329°35.7	10°05.6	11°56.3	4.6	22°08.2	-2.5	59.8
11	344°35.9	10°04.7	26°19.8	4.5	22°05.7	-2.7	59.8
12	359°36.1	10°03.8	40°43.3	4.5	22°02.9	-2.8	59.9
13	14°36.3	10°02.9	55°06.8	4.5	22°00.0	-3.0	59.9
14	29°36.4	10°02.1	69°30.3	4.5	21°57.0	-3.1	59.9
15	44°36.6	10°01.2	83°53.8	4.4	21°53.8	-3.3	60.0
16	59°36.8	10°00.3	98°17.2	4.4	21°50.4	-3.4	60.0
17	74°37.0	9°59.4	112°40.6	4.4	21°46.9	-3.6	60.0
18	89°37.2	9°58.6	127°04.0	4.4	21°43.2	-3.8	60.1
19	104°37.3	9°57.7	141°27.4	4.4	21°39.4	-3.9	60.1
20	119°37.5	9°56.8	155°50.8	4.4	21°35.4	-4.1	60.2
21	134°37.7	9°55.9	170°14.2	4.4	21°31.2	-4.2	60.2
22	149°37.9	9°55.0	184°37.5	4.4	21°26.9	-4.4	60.2
23	164°38.1	9°54.2	199°00.9	4.4	21°22.4	-4.5	60.2
	SD.=15.8	d=-0.9			S.D.=16.2		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°38.2	9°53.3	213°24.3	4.4	21°17.8	-4.7	60.3
1	194°38.4	9°52.4	227°47.6	4.4	21°13.0	-4.9	60.3
2	209°38.6	9°51.5	242°11.0	4.4	21°08.1	-5.0	60.3
3	224°38.8	9°50.7	256°34.3	4.4	21°03.0	-5.2	60.4
4	239°39.0	9°49.8	270°57.7	4.4	20°57.8	-5.3	60.4
5	254°39.2	9°48.9	285°21.1	4.4	20°52.4	-5.5	60.4
6	269°39.3	9°48.0	299°44.4	4.4	20°46.8	-5.6	60.5
7	284°39.5	9°47.1	314°07.8	4.4	20°41.1	-5.8	60.5
8	299°39.7	9°46.2	328°31.2	4.4	20°35.3	-5.9	60.5
9	314°39.9	9°45.4	342°54.6	4.4	20°29.2	-6.1	60.6
10	329°40.1	9°44.5	357°18.0	4.4	20°23.1	-6.2	60.6
11	344°40.2	9°43.6	11°41.4	4.4	20°16.8	-6.4	60.6
12	359°40.4	9°42.7	26°04.9	4.4	20°10.3	-6.5	60.6
13	14°40.6	9°41.8	40°28.3	4.5	20°03.7	-6.7	60.7
14	29°40.8	9°41.0	54°51.8	4.5	19°56.9	-6.8	60.7
15	44°41.0	9°40.1	69°15.3	4.5	19°50.0	-7.0	60.7
16	59°41.2	9°39.2	83°38.8	4.5	19°43.0	-7.1	60.7
17	74°41.3	9°38.3	98°02.4	4.6	19°35.7	-7.3	60.8
18	89°41.5	9°37.4	112°25.9	4.6	19°28.4	-7.4	60.8
19	104°41.7	9°36.5	126°49.5	4.6	19°20.9	-7.6	60.8
20	119°41.9	9°35.7	141°13.1	4.6	19°13.2	-7.7	60.8
21	134°42.1	9°34.8	155°36.8	4.7	19°05.5	-7.9	60.9
22	149°42.3	9°33.9	170°00.5	4.7	18°57.5	-8.0	60.9
23	164°42.5	9°33.0	184°24.2	4.7	18°49.5	-8.1	60.9
	SD.=15.8	d=-0.9			S.D.=16.4		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	01:46	03:34	20:25	22:09	–:–
70	–:–	02:27	03:52	20:08	21:31	–:–
68	–:–	02:55	04:06	19:54	21:05	–:–
66	01:32	03:15	04:17	19:43	20:45	22:24
64	02:08	03:31	04:27	19:34	20:29	21:50
62	02:34	03:44	04:35	19:26	20:17	21:26
60	02:53	03:55	04:42	19:19	20:06	21:07
58	03:08	04:05	04:48	19:13	19:56	20:52
56	03:21	04:13	04:54	19:08	19:48	20:40
54	03:32	04:20	04:59	19:03	19:41	20:29
52	03:42	04:27	05:03	18:59	19:35	20:20
50	03:50	04:33	05:07	18:55	19:29	20:11
45	04:07	04:45	05:16	18:47	19:18	19:55
40	04:21	04:54	05:23	18:40	19:08	19:42
35	04:31	05:03	05:29	18:34	19:00	19:31
30	04:40	05:09	05:34	18:29	18:53	19:22
20	04:54	05:21	05:43	18:20	18:42	19:09
10	05:05	05:30	05:51	18:12	18:33	18:58
0	05:13	05:37	05:58	18:05	18:26	18:50
-10	05:20	05:44	06:05	17:58	18:19	18:44
-20	05:25	05:51	06:13	17:50	18:13	18:38
-30	05:29	05:57	06:21	17:42	18:06	18:34
-35	05:31	06:01	06:26	17:37	18:03	18:32
-40	05:33	06:04	06:32	17:32	17:59	18:31
-45	05:34	06:08	06:38	17:26	17:56	18:30
-50	05:35	06:13	06:46	17:18	17:51	18:29
-52	05:36	06:15	06:49	17:15	17:49	18:29
-54	05:36	06:17	06:53	17:11	17:47	18:28
-56	05:36	06:19	06:57	17:07	17:45	18:28
-58	05:36	06:21	07:02	17:03	17:43	18:28
-60	05:36	06:24	07:07	16:58	17:40	18:29

Lat.	Moonrise			Moonset		
	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	21:18
68	–:–	22:47	–:–	–:–	20:41	20:30
66	22:16	23:44	–:–	19:05	19:44	19:58
64	22:57	–:–	00:18	18:24	19:10	19:35
62	23:25	–:–	00:42	17:56	18:45	19:16
60	23:47	–:–	01:02	17:34	18:25	19:01
58	–:–	00:05	01:18	17:16	18:09	18:48
56	–:–	00:19	01:31	17:01	17:55	18:36
54	–:–	00:32	01:43	16:48	17:43	18:26
52	–:–	00:44	01:54	16:37	17:32	18:17
50	–:–	00:54	02:03	16:27	17:23	18:09
45	00:17	01:15	02:22	16:06	17:03	17:52
40	00:34	01:32	02:38	15:49	16:46	17:38
35	00:48	01:46	02:52	15:34	16:32	17:26
30	01:00	01:59	03:03	15:22	16:20	17:15
20	01:21	02:20	03:23	15:00	15:60	16:57
10	01:39	02:38	03:41	14:42	15:42	16:41
0	01:56	02:56	03:57	14:24	15:25	16:26
-10	02:14	03:13	04:13	14:07	15:08	16:11
-20	02:32	03:32	04:30	13:48	14:50	15:54
-30	02:53	03:53	04:50	13:27	14:29	15:36
-35	03:06	04:06	05:01	13:14	14:16	15:25
-40	03:20	04:20	05:15	12:60	14:02	15:12
-45	03:37	04:37	05:30	12:43	13:45	14:57
-50	03:58	04:58	05:49	12:21	13:24	14:39
-52	04:08	05:08	05:59	12:11	13:14	14:30
-54	04:20	05:20	06:09	11:60	13:03	14:20
-56	04:33	05:33	06:20	11:47	12:50	14:09
-58	04:48	05:48	06:33	11:31	12:36	13:57
-60	05:06	06:05	06:48	11:13	12:18	13:42

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
26	02:01	01:53	12:01	08:10	20:40	25(21%)
27	01:44	01:36	12:01	09:10	21:40	26(12%)
28	01:27	01:18	12:01	10:11	22:41	27(6%)

August 29, 30 ,31 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	336°54.7	175°21.8	9°20.5	177°55.0	10°00.7	83°11.0	-22°14.4	51°28.6	-22°26.4
1	351°57.2	190°21.3	9°19.3	192°55.9	10°00.1	98°13.3	-22°14.4	66°31.1	-22°26.4
2	6°59.6	205°20.9	9°18.2	207°56.9	9°59.5	113°15.6	-22°14.5	81°33.7	-22°26.5
3	22°02.1	220°20.5	9°17.0	222°57.9	9°58.9	128°18.0	-22°14.5	96°36.2	-22°26.5
4	37°04.6	235°20.0	9°15.8	237°58.8	9°58.3	143°20.3	-22°14.5	111°38.7	-22°26.5
5	52°07.0	250°19.6	9°14.7	252°59.8	9°57.7	158°22.6	-22°14.5	126°41.3	-22°26.5
6	67°09.5	265°19.1	9°13.5	268°00.8	9°57.1	173°24.9	-22°14.6	141°43.8	-22°26.5
7	82°12.0	280°18.7	9°12.3	283°01.7	9°56.5	188°27.2	-22°14.6	156°46.4	-22°26.5
8	97°14.4	295°18.2	9°11.2	298°02.7	9°55.9	203°29.6	-22°14.6	171°48.9	-22°26.5
9	112°16.9	310°17.8	9°10.0	313°03.7	9°55.3	218°31.9	-22°14.6	186°51.5	-22°26.5
10	127°19.4	325°17.4	9°08.8	328°04.6	9°54.7	233°34.2	-22°14.6	201°54.0	-22°26.6
11	142°21.8	340°16.9	9°07.7	343°05.6	9°54.1	248°36.5	-22°14.7	216°56.6	-22°26.6
12	157°24.3	355°16.5	9°06.5	358°06.6	9°53.5	263°38.8	-22°14.7	231°59.1	-22°26.6
13	172°26.7	10°16.0	9°05.3	13°07.5	9°52.9	278°41.2	-22°14.7	247°01.7	-22°26.6
14	187°29.2	25°15.6	9°04.1	28°08.5	9°52.3	293°43.5	-22°14.7	262°04.2	-22°26.6
15	202°31.7	40°15.1	9°03.0	43°09.5	9°51.7	308°45.8	-22°14.8	277°06.8	-22°26.6
16	217°34.1	55°14.7	9°01.8	58°10.4	9°51.1	323°48.1	-22°14.8	292°09.3	-22°26.6
17	232°36.6	70°14.3	9°00.6	73°11.4	9°50.5	338°50.4	-22°14.8	307°11.9	-22°26.6
18	247°39.1	85°13.8	8°59.5	88°12.4	9°49.9	353°52.8	-22°14.8	322°14.4	-22°26.7
19	262°41.5	100°13.4	8°58.3	103°13.3	9°49.3	8°55.1	-22°14.9	337°17.0	-22°26.7
20	277°44.0	115°12.9	8°57.1	118°14.3	9°48.7	23°57.4	-22°14.9	352°19.5	-22°26.7
21	292°46.5	130°12.5	8°55.9	133°15.3	9°48.1	38°59.7	-22°14.9	7°22.1	-22°26.7
22	307°48.9	145°12.1	8°54.8	148°16.2	9°47.5	54°02.0	-22°14.9	22°24.6	-22°26.7
23	322°51.4	160°11.6	8°53.6	163°17.2	9°46.9	69°04.3	-22°14.9	37°27.2	-22°26.7
Mer.pass.:1:32:		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.5 d-0.0 m0.3	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	337°53.9	175°11.2	8°52.4	178°18.2	9°46.3	84°06.6	-22°15.0	52°29.7	-22°26.7
1	352°56.3	190°10.8	8°51.2	193°19.1	9°45.7	99°09.0	-22°15.0	67°32.2	-22°26.7
2	7°58.8	205°10.3	8°50.1	208°20.1	9°45.1	114°11.3	-22°15.0	82°34.8	-22°26.8
3	23°01.2	220°09.9	8°48.9	223°21.1	9°44.5	129°13.6	-22°15.0	97°37.3	-22°26.8
4	38°03.7	235°09.4	8°47.7	238°22.0	9°43.9	144°15.9	-22°15.1	112°39.9	-22°26.8
5	53°06.2	250°09.0	8°46.5	253°23.0	9°43.3	159°18.2	-22°15.1	127°42.4	-22°26.8
6	68°08.6	265°08.6	8°45.4	268°24.0	9°42.7	174°20.5	-22°15.1	142°45.0	-22°26.8
7	83°11.1	280°08.1	8°44.2	283°24.9	9°42.1	189°22.8	-22°15.1	157°47.5	-22°26.8
8	98°13.6	295°07.7	8°43.0	298°25.9	9°41.5	204°25.2	-22°15.1	172°50.1	-22°26.8
9	113°16.0	310°07.3	8°41.8	313°26.9	9°40.9	219°27.5	-22°15.2	187°52.6	-22°26.8
10	128°18.5	325°06.8	8°40.7	328°27.9	9°40.3	234°29.8	-22°15.2	202°55.2	-22°26.9
11	143°21.0	340°06.4	8°39.5	343°28.8	9°39.7	249°32.1	-22°15.2	217°57.7	-22°26.9
12	158°23.4	355°06.0	8°38.3	358°29.8	9°39.1	264°34.4	-22°15.2	233°00.2	-22°26.9
13	173°25.9	10°05.5	8°37.1	13°30.8	9°38.5	279°36.7	-22°15.3	248°02.8	-22°26.9
14	188°28.3	25°05.1	8°35.9	28°31.7	9°37.9	294°39.0	-22°15.3	263°05.3	-22°26.9
15	203°30.8	40°04.7	8°34.8	43°32.7	9°37.3	309°41.3	-22°15.3	278°07.9	-22°26.9
16	218°33.3	55°04.2	8°33.6	58°33.7	9°36.7	324°43.7	-22°15.3	293°10.4	-22°26.9
17	233°35.7	70°03.8	8°32.4	73°34.6	9°36.1	339°46.0	-22°15.4	308°13.0	-22°26.9
18	248°38.2	85°03.4	8°31.2	88°35.6	9°35.5	354°48.3	-22°15.4	323°15.5	-22°26.9
19	263°40.7	100°02.9	8°30.0	103°36.6	9°34.9	9°50.6	-22°15.4	338°18.0	-22°27.0
20	278°43.1	115°02.5	8°28.8	118°37.5	9°34.3	24°52.9	-22°15.4	353°20.6	-22°27.0
21	293°45.6	130°02.1	8°27.7	133°38.5	9°33.7	39°55.2	-22°15.4	8°23.1	-22°27.0
22	308°48.1	145°01.6	8°26.5	148°39.5	9°33.1	54°57.5	-22°15.5	23°25.7	-22°27.0
23	323°50.5	160°01.2	8°25.3	163°40.4	9°32.5	69°59.8	-22°15.5	38°28.2	-22°27.0
Mer.pass.:1:28:		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.5 d-0.0 m0.3	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	338°53.0	175°00.8	8°24.1	178°41.4	9°31.9	85°02.1	-22°15.5	53°30.8	-22°27.0
1	353°55.5	190°00.3	8°22.9	193°42.4	9°31.3	100°04.4	-22°15.5	68°33.3	-22°27.0
2	8°57.9	204°59.9	8°21.7	208°43.4	9°30.7	115°06.7	-22°15.6	83°35.8	-22°27.0
3	24°00.4	219°59.5	8°20.6	223°44.3	9°30.1	130°09.0	-22°15.6	98°38.4	-22°27.1
4	39°02.8	234°59.1	8°19.4	238°45.3	9°29.5	145°11.3	-22°15.6	113°40.9	-22°27.1
5	54°05.3	249°58.6	8°18.2	253°46.3	9°28.9	160°13.7	-22°15.6	128°43.5	-22°27.1
6	69°07.8	264°58.2	8°17.0	268°47.2	9°28.3	175°16.0	-22°15.7	143°46.0	-22°27.1
7	84°10.2	279°57.8	8°15.8	283°48.2	9°27.7	190°18.3	-22°15.7	158°48.5	-22°27.1
8	99°12.7	294°57.3	8°14.6	298°49.2	9°27.1	205°20.6	-22°15.7	173°51.1	-22°27.1
9	114°15.2	309°56.9	8°13.4	313°50.1	9°26.5	220°22.9	-22°15.7	188°53.6	-22°27.1
10	129°17.6	324°56.5	8°12.2	328°51.1	9°25.8	235°25.2	-22°15.8	203°56.2	-22°27.1
11	144°20.1	339°56.1	8°11.1	343°52.1	9°25.2	250°27.5	-22°15.8	218°58.7	-22°27.2
12	159°22.6	354°55.6	8°09.9	358°53.1	9°24.6	265°29.8	-22°15.8	234°01.2	-22°27.2
13	174°25.0	9°55.2	8°08.7	13°54.0	9°24.0	280°32.1	-22°15.8	249°03.8	-22°27.2
14	189°27.5	24°54.8	8°07.5	28°55.0	9°23.4	295°34.4	-22°15.9	264°06.3	-22°27.2
15	204°30.0	39°54.3	8°06.3	43°56.0	9°22.8	310°36.7	-22°15.9	279°08.9	-22°27.2
16	219°32.4	54°53.9	8°05.1	58°56.9	9°22.2	325°39.0	-22°15.9	294°11.4	-22°27.2
17	234°34.9	69°53.5	8°03.9	73°57.9	9°21.6	340°41.3	-22°15.9	309°13.9	-22°27.2
18	249°37.3	84°53.1	8°02.7	88°58.9	9°21.0	355°43.6	-22°15.9	324°16.5	-22°27.2
19	264°39.8	99°52.6	8°01.5	103°59.9	9°20.4	10°45.9	-22°16.0	339°19.0	-22°27.2
20	279°42.3	114°52.2	8°00.3	119°00.8	9°19.8	25°48.2	-22°16.0	354°21.6	-22°27.3
21	294°44.7	129°51.8	7°59.2	134°01.8	9°19.2	40°50.5	-22°16.0	9°24.1	-22°27.3
22	309°47.2	144°51.4	7°58.0	149°02.8	9°18.6	55°52.8	-22°16.0	24°26.6	-22°27.3
23	324°49.7	159°50.9	7°56.8	164°03.7	9°18.0	70°55.1	-22°16.1	39°29.2	-22°27.3
Mer.pass.:1:24:		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.5 d-0.0 m0.3	

Stars	SHA	Dec
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.1	-42°11.9
Schedar	349°35.2	56°38.5
Diphda	348°51.2	-17°52.7
Achernar	335°23.2	-57°08.1
Hamal	327°55.8	23°33.2
Polaris	315°45.3	89°20.4
Akamar	315°14.9	-40°13.4
Menkar	314°10.5	4°10.0
Mirfak	308°34.1	49°55.5
Aldebaran	290°44.5	16°32.8
Rigel	281°08.0	-8°10.7
Capella	280°28.3	46°00.8
Bellatrix	278°27.5	6°22.0
Elnath	278°07.3	28°37.3
Alnilam	275°42.2	-1°11.4
Betelgeuse	270°56.8	7°24.6
Canopus	263°54.5	-52°42.2
Sirius	258°30.1	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.4	5°10.7
Pollux	243°22.7	27°58.7
Avior	234°16.9	-59°34.2
Suhail	222°49.8	-43°30.5
Miaplacidus	221°39.8	-69°47.7
Alphard	217°52.2	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.9
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.2	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.4	55°51.5
Spica	158°27.0	-11°15.6
Alcaid	152°55.8	49°13.3
Hadar	148°42.2	-60°28.1
Menkent	148°02.8	-36°27.9
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.3	-60°55.0
Zubenelg.	137°00.8	-16°07.2
Kochab	137°20.5	74°04.9
Alphecca	126°07.5	26°39.3
Antares	112°21.0	-26°28.4
Atria	107°18.9	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.0	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°44.0	51°29.6
Kaus Aust.	83°38.0	-34°22.4
Vega	80°35.9	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.0	-56°40.3
Deneb	49°28.2	45°21.2
Enif	33°42.6	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/8/2	**SHA**	**Mer.pass**
Venus	198°27.1	12:19
Mars	201°00.2	12:08
Jupiter	106°16.3	18:24
Saturn	74°33.8	20:31

2019/8/3	**SHA**	**Mer.pass**
Venus	197°17.3	12:20
Mars	200°24.3	12:06
Jupiter	106°12.8	18:21
Saturn	74°35.8	20:27

2019/8/3	**SHA**	**Mer.pass**
Venus	196°07.8	12:20
Mars	199°48.4	12:04
Jupiter	106°09.1	18:17
Saturn	74°37.8	20:22

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°42.6	9°32.1	198°47.9	4.8	18°41.3	-8.3	60.9
1	194°42.8	9°31.2	213°11.7	4.8	18°32.9	-8.4	61.0
2	209°43.0	9°30.3	227°35.5	4.8	18°24.4	-8.6	61.0
3	224°43.2	9°29.5	241°59.3	4.9	18°15.8	-8.7	61.0
4	239°43.4	9°28.6	256°23.2	4.9	18°07.0	-8.8	61.0
5	254°43.6	9°27.7	270°47.1	4.9	17°58.2	-9.0	61.0
6	269°43.8	9°26.8	285°11.1	5.0	17°49.1	-9.1	61.1
7	284°43.9	9°25.9	299°35.1	5.0	17°40.0	-9.2	61.1
8	299°44.1	9°25.0	313°59.1	5.1	17°30.7	-9.4	61.1
9	314°44.3	9°24.1	328°23.2	5.1	17°21.3	-9.5	61.1
10	329°44.5	9°23.2	342°47.3	5.1	17°11.7	-9.6	61.1
11	344°44.7	9°22.4	357°11.5	5.2	17°02.0	-9.7	61.1
12	359°44.9	9°21.5	11°35.7	5.2	16°52.3	-9.9	61.2
13	14°45.1	9°20.6	25°60.0	5.3	16°42.3	-10.0	61.2
14	29°45.2	9°19.7	40°24.3	5.3	16°32.3	-10.1	61.2
15	44°45.4	9°18.8	54°48.6	5.4	16°22.1	-10.2	61.2
16	59°45.6	9°17.9	69°13.0	5.4	16°11.8	-10.3	61.2
17	74°45.8	9°17.0	83°37.5	5.5	16°01.4	-10.5	61.2
18	89°46.0	9°16.1	98°02.0	5.5	15°50.9	-10.6	61.2
19	104°46.2	9°15.2	112°26.5	5.6	15°40.3	-10.7	61.3
20	119°46.4	9°14.3	126°51.1	5.6	15°29.5	-10.8	61.3
21	134°46.6	9°13.5	141°15.7	5.7	15°18.7	-10.9	61.3
22	149°46.8	9°12.6	155°40.4	5.7	15°07.7	-11.0	61.3
23	164°46.9	9°11.7	170°05.2	5.8	14°56.6	-11.1	61.3
	SD.=15.8	d=-0.9			S.D.=16.6		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°47.1	9°10.8	184°30.0	5.8	14°45.5	-11.2	61.3
1	194°47.3	9°09.9	198°54.9	5.9	14°34.2	-11.3	61.3
2	209°47.5	9°09.0	213°19.8	5.9	14°22.8	-11.4	61.3
3	224°47.7	9°08.1	227°44.7	6.0	14°11.3	-11.5	61.3
4	239°47.9	9°07.2	242°09.8	6.0	13°59.7	-11.6	61.3
5	254°48.1	9°06.3	256°34.8	6.1	13°48.0	-11.7	61.4
6	269°48.3	9°05.4	270°60.0	6.2	13°36.2	-11.8	61.4
7	284°48.5	9°04.5	285°25.1	6.2	13°24.3	-11.9	61.4
8	299°48.6	9°03.6	299°50.4	6.3	13°12.3	-12.0	61.4
9	314°48.8	9°02.7	314°15.7	6.3	13°00.3	-12.1	61.4
10	329°49.0	9°01.9	328°41.0	6.4	12°48.1	-12.2	61.4
11	344°49.2	9°01.0	343°06.4	6.4	12°35.8	-12.3	61.4
12	359°49.4	9°00.1	357°31.9	6.5	12°23.5	-12.4	61.4
13	14°49.6	8°59.2	11°57.4	6.5	12°11.1	-12.5	61.4
14	29°49.8	8°58.3	26°23.0	6.6	11°58.6	-12.5	61.4
15	44°50.0	8°57.4	40°48.6	6.7	11°46.0	-12.6	61.4
16	59°50.2	8°56.5	55°14.3	6.7	11°33.3	-12.7	61.4
17	74°50.4	8°55.6	69°40.0	6.8	11°20.6	-12.8	61.4
18	89°50.6	8°54.7	84°05.8	6.8	11°07.8	-12.9	61.4
19	104°50.7	8°53.8	98°31.7	6.9	10°54.9	-12.9	61.4
20	119°50.9	8°52.9	112°57.6	6.9	10°41.9	-13.0	61.4
21	134°51.1	8°52.0	127°23.5	7.0	10°28.9	-13.1	61.4
22	149°51.3	8°51.1	141°49.6	7.0	10°15.8	-13.1	61.4
23	164°51.5	8°50.2	156°15.6	7.1	10°02.6	-13.2	61.4
	SD.=15.8	d=-0.9			S.D.=16.7		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°51.7	8°49.3	170°41.8	7.2	9°49.4	-13.3	61.4
1	194°51.9	8°48.4	185°07.9	7.2	9°36.1	-13.3	61.4
2	209°52.1	8°47.5	199°34.2	7.3	9°22.7	-13.4	61.4
3	224°52.3	8°46.6	214°00.5	7.3	9°09.3	-13.4	61.4
4	239°52.5	8°45.7	228°26.8	7.4	8°55.9	-13.5	61.3
5	254°52.7	8°44.8	242°53.2	7.4	8°42.3	-13.6	61.3
6	269°52.9	8°43.9	257°19.7	7.5	8°28.8	-13.6	61.3
7	284°53.1	8°43.0	271°46.2	7.5	8°15.1	-13.7	61.3
8	299°53.2	8°42.1	286°12.7	7.6	8°01.5	-13.7	61.3
9	314°53.4	8°41.2	300°39.4	7.6	7°47.7	-13.7	61.3
10	329°53.6	8°40.3	315°06.0	7.7	7°34.0	-13.8	61.3
11	344°53.8	8°39.4	329°32.7	7.7	7°20.1	-13.8	61.3
12	359°54.0	8°38.5	343°59.5	7.8	7°06.3	-13.9	61.3
13	14°54.2	8°37.6	358°26.3	7.8	6°52.4	-13.9	61.3
14	29°54.4	8°36.7	12°53.2	7.9	6°38.5	-14.0	61.2
15	44°54.6	8°35.8	27°20.1	7.9	6°24.5	-14.0	61.2
16	59°54.8	8°34.9	41°47.1	8.0	6°10.5	-14.0	61.2
17	74°55.0	8°34.0	56°14.1	8.0	5°56.4	-14.1	61.2
18	89°55.2	8°33.1	70°41.2	8.1	5°42.4	-14.1	61.2
19	104°55.4	8°32.2	85°08.3	8.1	5°28.3	-14.1	61.2
20	119°55.6	8°31.3	99°35.4	8.2	5°14.2	-14.1	61.2
21	134°55.8	8°30.4	114°02.7	8.2	5°00.0	-14.2	61.1
22	149°56.0	8°29.5	128°29.9	8.3	4°45.8	-14.2	61.1
23	164°56.2	8°28.6	142°57.2	8.3	4°31.6	-14.2	61.1
	SD.=15.8	d=-0.9			S.D.=16.7		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:13	03:50	20:08	21:42	–:–
70	–:–	02:46	04:05	19:53	21:11	–:–
68	01:05	03:09	04:17	19:41	20:48	22:45
66	01:55	03:27	04:27	19:32	20:31	22:01
64	02:24	03:42	04:36	19:24	20:17	21:33
62	02:46	03:53	04:43	19:17	20:06	21:12
60	03:03	04:04	04:49	19:11	19:56	20:55
58	03:17	04:12	04:55	19:05	19:48	20:42
56	03:29	04:20	04:60	19:00	19:40	20:30
54	03:39	04:26	05:04	18:56	19:34	20:20
52	03:48	04:32	05:08	18:52	19:28	20:12
50	03:56	04:37	05:11	18:49	19:23	20:04
45	04:12	04:49	05:19	18:41	19:12	19:49
40	04:24	04:58	05:25	18:35	19:03	19:36
35	04:34	05:05	05:31	18:30	18:56	19:27
30	04:42	05:11	05:36	18:25	18:50	19:18
20	04:55	05:21	05:44	18:17	18:40	19:06
10	05:05	05:30	05:51	18:10	18:32	18:56
0	05:12	05:36	05:57	18:04	18:25	18:49
-10	05:18	05:43	06:04	17:58	18:19	18:44
-20	05:23	05:48	06:11	17:51	18:13	18:39
-30	05:26	05:54	06:18	17:44	18:08	18:36
-35	05:27	05:57	06:22	17:40	18:05	18:34
-40	05:28	05:60	06:27	17:35	18:02	18:34
-45	05:29	06:03	06:33	17:29	17:59	18:33
-50	05:29	06:07	06:39	17:23	17:56	18:33
-52	05:29	06:08	06:42	17:20	17:54	18:33
-54	05:29	06:10	06:46	17:17	17:52	18:33
-56	05:29	06:12	06:49	17:13	17:51	18:34
-58	05:28	06:14	06:54	17:09	17:49	18:34
-60	05:28	06:16	06:58	17:04	17:47	18:35

Lat.	**Moonrise**			**Moonset**		
	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	02:25	04:58	21:20	20:47	20:24
70	00:19	02:56	05:12	20:47	20:31	20:18
68	01:07	03:18	05:23	20:23	20:17	20:12
66	01:37	03:35	05:32	20:04	20:07	20:07
64	01:60	03:50	05:40	19:49	19:58	20:03
62	02:18	04:01	05:46	19:36	19:50	19:60
60	02:33	04:11	05:52	19:25	19:43	19:57
58	02:45	04:20	05:57	19:16	19:37	19:54
56	02:56	04:28	06:01	19:07	19:31	19:52
54	03:06	04:34	06:05	18:60	19:27	19:49
52	03:14	04:40	06:08	18:53	19:22	19:47
50	03:22	04:46	06:12	18:47	19:18	19:45
45	03:38	04:58	06:18	18:34	19:10	19:41
40	03:51	05:07	06:24	18:23	19:02	19:38
35	04:03	05:16	06:29	18:13	18:56	19:35
30	04:12	05:23	06:33	18:05	18:50	19:32
20	04:29	05:35	06:41	17:50	18:41	19:28
10	04:44	05:46	06:47	17:38	18:32	19:23
0	04:57	05:57	06:53	17:26	18:24	19:19
-10	05:11	06:07	06:59	17:14	18:16	19:15
-20	05:26	06:18	07:06	17:01	18:07	19:11
-30	05:42	06:30	07:13	16:46	17:57	19:06
-35	05:52	06:37	07:18	16:37	17:51	19:03
-40	06:03	06:45	07:22	16:27	17:44	19:00
-45	06:16	06:54	07:28	16:15	17:36	18:56
-50	06:31	07:06	07:34	16:01	17:26	18:52
-52	06:39	07:11	07:38	15:54	17:22	18:50
-54	06:47	07:17	07:41	15:47	17:17	18:47
-56	06:56	07:23	07:44	15:38	17:11	18:45
-58	07:06	07:30	07:49	15:29	17:05	18:42
-60	07:18	07:38	07:53	15:18	16:58	18:38

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
29	01:09	01:00	12:01	11:11	23:41	28(1%)
30	00:51	00:42	12:00	12:10	00:38	0(0%)
31	00:33	00:24	12:00	13:06	00:38	1(2%)

September 01, 02 ,03 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	339°52.1	174°50.5	7°55.6	179°04.7	9°17.4	85°57.4	-22°16.1	54°31.7	-22°27.3
1	354°54.6	189°50.1	7°54.4	194°05.7	9°16.8	100°59.7	-22°16.1	69°34.2	-22°27.3
2	9°57.1	204°49.7	7°53.2	209°06.7	9°16.2	116°02.0	-22°16.1	84°36.8	-22°27.3
3	24°59.5	219°49.3	7°52.0	224°07.6	9°15.6	131°04.3	-22°16.2	99°39.3	-22°27.3
4	40°02.0	234°48.8	7°50.8	239°08.6	9°15.0	146°06.6	-22°16.2	114°41.9	-22°27.3
5	55°04.4	249°48.4	7°49.6	254°09.6	9°14.4	161°08.9	-22°16.2	129°44.4	-22°27.4
6	70°06.9	264°48.0	7°48.4	269°10.5	9°13.8	176°11.2	-22°16.2	144°46.9	-22°27.4
7	85°09.4	279°47.6	7°47.2	284°11.5	9°13.2	191°13.5	-22°16.3	159°49.5	-22°27.4
8	100°11.8	294°47.1	7°46.0	299°12.5	9°12.6	206°15.8	-22°16.3	174°52.0	-22°27.4
9	115°14.3	309°46.7	7°44.8	314°13.5	9°11.9	221°18.1	-22°16.3	189°54.5	-22°27.4
10	130°16.8	324°46.3	7°43.6	329°14.4	9°11.3	236°20.4	-22°16.3	204°57.1	-22°27.4
11	145°19.2	339°45.9	7°42.4	344°15.4	9°10.7	251°22.7	-22°16.4	219°59.6	-22°27.4
12	160°21.7	354°45.5	7°41.2	359°16.4	9°10.1	266°25.0	-22°16.4	235°02.2	-22°27.4
13	175°24.2	9°45.0	7°40.0	14°17.3	9°09.5	281°27.3	-22°16.4	250°04.7	-22°27.5
14	190°26.6	24°44.6	7°38.8	29°18.3	9°08.9	296°29.6	-22°16.4	265°07.2	-22°27.5
15	205°29.1	39°44.2	7°37.6	44°19.3	9°08.3	311°31.9	-22°16.5	280°09.8	-22°27.5
16	220°31.6	54°43.8	7°36.4	59°20.3	9°07.7	326°34.2	-22°16.5	295°12.3	-22°27.5
17	235°34.0	69°43.4	7°35.2	74°21.2	9°07.1	341°36.5	-22°16.5	310°14.8	-22°27.5
18	250°36.5	84°42.9	7°34.0	89°22.2	9°06.5	356°38.7	-22°16.5	325°17.4	-22°27.5
19	265°38.9	99°42.5	7°32.8	104°23.2	9°05.9	11°41.0	-22°16.6	340°19.9	-22°27.5
20	280°41.4	114°42.1	7°31.6	119°24.2	9°05.3	26°43.3	-22°16.6	355°22.4	-22°27.5
21	295°43.9	129°41.7	7°30.4	134°25.1	9°04.7	41°45.6	-22°16.6	10°25.0	-22°27.5
22	310°46.3	144°41.3	7°29.2	149°26.1	9°04.1	56°47.9	-22°16.6	25°27.5	-22°27.6
23	325°48.8	159°40.9	7°28.0	164°27.1	9°03.5	71°50.2	-22°16.7	40°30.0	-22°27.6
Mer.pass.:1:20:		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.5 d-0.0 m0.3	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	340°51.3	174°40.4	7°26.8	179°28.0	9°02.8	86°52.5	-22°16.7	55°32.6	-22°27.6
1	355°53.7	189°40.0	7°25.6	194°29.0	9°02.2	101°54.8	-22°16.7	70°35.1	-22°27.6
2	10°56.2	204°39.6	7°24.4	209°30.0	9°01.6	116°57.1	-22°16.7	85°37.6	-22°27.6
3	25°58.7	219°39.2	7°23.2	224°31.0	9°01.0	131°59.4	-22°16.8	100°40.2	-22°27.6
4	41°01.1	234°38.8	7°22.0	239°31.9	9°00.4	147°01.7	-22°16.8	115°42.7	-22°27.6
5	56°03.6	249°38.4	7°20.8	254°32.9	8°59.8	162°04.0	-22°16.8	130°45.2	-22°27.6
6	71°06.0	264°37.9	7°19.6	269°33.9	8°59.2	177°06.2	-22°16.8	145°47.8	-22°27.6
7	86°08.5	279°37.5	7°18.4	284°34.9	8°58.6	192°08.5	-22°16.9	160°50.3	-22°27.7
8	101°11.0	294°37.1	7°17.2	299°35.8	8°58.0	207°10.8	-22°16.9	175°52.8	-22°27.7
9	116°13.4	309°36.7	7°16.0	314°36.8	8°57.4	222°13.1	-22°16.9	190°55.4	-22°27.7
10	131°15.9	324°36.3	7°14.8	329°37.8	8°56.8	237°15.4	-22°16.9	205°57.9	-22°27.7
11	146°18.4	339°35.9	7°13.6	344°38.8	8°56.2	252°17.7	-22°17.0	221°00.4	-22°27.7
12	161°20.8	354°35.4	7°12.4	359°39.7	8°55.6	267°20.0	-22°17.0	236°03.0	-22°27.7
13	176°23.3	9°35.0	7°11.2	14°40.7	8°54.9	282°22.3	-22°17.0	251°05.5	-22°27.7
14	191°25.8	24°34.6	7°09.9	29°41.7	8°54.3	297°24.6	-22°17.0	266°08.0	-22°27.7
15	206°28.2	39°34.2	7°08.7	44°42.7	8°53.7	312°26.8	-22°17.1	281°10.6	-22°27.7
16	221°30.7	54°33.8	7°07.5	59°43.6	8°53.1	327°29.1	-22°17.1	296°13.1	-22°27.8
17	236°33.2	69°33.4	7°06.3	74°44.6	8°52.5	342°31.4	-22°17.1	311°15.6	-22°27.8
18	251°35.6	84°33.0	7°05.1	89°45.6	8°51.9	357°33.7	-22°17.1	326°18.1	-22°27.8
19	266°38.1	99°32.6	7°03.9	104°46.5	8°51.3	12°36.0	-22°17.2	341°20.7	-22°27.8
20	281°40.5	114°32.1	7°02.7	119°47.5	8°50.7	27°38.3	-22°17.2	356°23.2	-22°27.8
21	296°43.0	129°31.7	7°01.5	134°48.5	8°50.1	42°40.6	-22°17.2	11°25.7	-22°27.8
22	311°45.5	144°31.3	7°00.3	149°49.5	8°49.5	57°42.8	-22°17.2	26°28.3	-22°27.8
23	326°47.9	159°30.9	6°59.1	164°50.4	8°48.9	72°45.1	-22°17.3	41°30.8	-22°27.8
Mer.pass.:1:16:		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.1		v2.5 d-0.0 m0.3	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	341°50.4	174°30.5	6°57.9	179°51.4	8°48.3	87°47.4	-22°17.3	56°33.3	-22°27.8
1	356°52.9	189°30.1	6°56.6	194°52.4	8°47.6	102°49.7	-22°17.3	71°35.9	-22°27.8
2	11°55.3	204°29.7	6°55.4	209°53.4	8°47.0	117°52.0	-22°17.3	86°38.4	-22°27.9
3	26°57.8	219°29.3	6°54.2	224°54.3	8°46.4	132°54.3	-22°17.4	101°40.9	-22°27.9
4	42°00.3	234°28.9	6°53.0	239°55.3	8°45.8	147°56.5	-22°17.4	116°43.4	-22°27.9
5	57°02.7	249°28.4	6°51.8	254°56.3	8°45.2	162°58.8	-22°17.4	131°46.0	-22°27.9
6	72°05.2	264°28.0	6°50.6	269°57.3	8°44.6	178°01.1	-22°17.4	146°48.5	-22°27.9
7	87°07.6	279°27.6	6°49.4	284°58.2	8°44.0	193°03.4	-22°17.5	161°51.0	-22°27.9
8	102°10.1	294°27.2	6°48.2	299°59.2	8°43.4	208°05.7	-22°17.5	176°53.6	-22°27.9
9	117°12.6	309°26.8	6°46.9	315°00.2	8°42.8	223°08.0	-22°17.5	191°56.1	-22°27.9
10	132°15.0	324°26.4	6°45.7	330°01.2	8°42.2	238°10.2	-22°17.5	206°58.6	-22°27.9
11	147°17.5	339°26.0	6°44.5	345°02.1	8°41.5	253°12.5	-22°17.6	222°01.1	-22°28.0
12	162°20.0	354°25.6	6°43.3	0°03.1	8°40.9	268°14.8	-22°17.6	237°03.7	-22°28.0
13	177°22.4	9°25.2	6°42.1	15°04.1	8°40.3	283°17.1	-22°17.6	252°06.2	-22°28.0
14	192°24.9	24°24.8	6°40.9	30°05.1	8°39.7	298°19.4	-22°17.6	267°08.7	-22°28.0
15	207°27.4	39°24.4	6°39.7	45°06.0	8°39.1	313°21.6	-22°17.7	282°11.3	-22°28.0
16	222°29.8	54°24.0	6°38.4	60°07.0	8°38.5	328°23.9	-22°17.7	297°13.8	-22°28.0
17	237°32.3	69°23.5	6°37.2	75°08.0	8°37.9	343°26.2	-22°17.7	312°16.3	-22°28.0
18	252°34.8	84°23.1	6°36.0	90°09.0	8°37.3	358°28.5	-22°17.8	327°18.8	-22°28.0
19	267°37.2	99°22.7	6°34.8	105°10.0	8°36.7	13°30.8	-22°17.8	342°21.4	-22°28.0
20	282°39.7	114°22.3	6°33.6	120°10.9	8°36.0	28°33.0	-22°17.8	357°23.9	-22°28.0
21	297°42.1	129°21.9	6°32.3	135°11.9	8°35.4	43°35.3	-22°17.8	12°26.4	-22°28.1
22	312°44.6	144°21.5	6°31.1	150°12.9	8°34.8	58°37.6	-22°17.9	27°28.9	-22°28.1
23	327°47.1	159°21.1	6°29.9	165°13.9	8°34.2	73°39.9	-22°17.9	42°31.5	-22°28.1
Mer.pass.:1:12:		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.0		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.1	-42°11.9
Schedar	349°35.2	56°38.5
Diphda	348°51.2	-17°52.7
Achernar	335°23.2	-57°08.1
Hamal	327°55.8	23°33.2
Polaris	315°44.1	89°20.4
Akamar	315°14.9	-40°13.4
Menkar	314°10.5	4°10.0
Mirfak	308°34.1	49°55.5
Aldebaran	290°44.5	16°32.8
Rigel	281°08.0	-8°10.7
Capella	280°28.3	46°00.8
Bellatrix	278°27.5	6°22.0
Elnath	278°07.3	28°37.3
Alnilam	275°42.1	-1°11.4
Betelgeuse	270°56.8	7°24.6
Canopus	263°54.5	-52°42.1
Sirius	258°30.1	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.4	5°10.7
Pollux	243°22.7	27°58.7
Avior	234°16.9	-59°34.1
Suhail	222°49.7	-43°30.5
Miaplacidus	221°39.8	-69°47.7
Alphard	217°52.2	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.9
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.2	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.4	55°51.5
Spica	158°27.0	-11°15.6
Alcaid	152°55.8	49°13.3
Hadar	148°42.3	-60°28.1
Menkent	148°02.8	-36°27.9
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.3	-60°55.0
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.6	74°04.9
Alphecca	126°07.5	26°39.3
Antares	112°21.0	-26°28.4
Atria	107°19.0	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.0	-37°07.0
Rasalhague	96°02.4	12°33.1
Etamin	90°44.0	51°29.6
Kaus Aust.	83°38.0	-34°22.4
Vega	80°35.9	38°48.4
Nunki	75°52.8	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.0	-56°40.3
Deneb	49°28.2	45°21.2
Enif	33°42.7	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/9/1	**SHA**	**Mer.pass**
Venus	194°58.4	12:21
Mars	199°12.6	12:03
Jupiter	106°05.3	18:13
Saturn	74°39.6	20:18

2019/9/2	**SHA**	**Mer.pass**
Venus	193°49.2	12:22
Mars	198°36.8	12:01
Jupiter	106°01.2	18:10
Saturn	74°41.3	20:14

2019/9/3	**SHA**	**Mer.pass**
Venus	192°40.1	12:22
Mars	198°01.0	11:60
Jupiter	105°57.0	18:06
Saturn	74°42.9	20:10

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	**ν**	**Dec**	**d**	**HP**
0	179°56.4	8°27.7	157°24.5	8.4	4°17.4	-14.2	61.1
1	194°56.6	8°26.8	171°51.9	8.4	4°03.2	-14.2	61.1
2	209°56.7	8°25.9	186°19.4	8.5	3°48.9	-14.3	61.1
3	224°56.9	8°25.0	200°46.8	8.5	3°34.7	-14.3	61.0
4	239°57.1	8°24.1	215°14.4	8.5	3°20.4	-14.3	61.0
5	254°57.3	8°23.2	229°41.9	8.6	3°06.1	-14.3	61.0
6	269°57.5	8°22.3	244°09.5	8.6	2°51.8	-14.3	61.0
7	284°57.7	8°21.4	258°37.2	8.7	2°37.5	-14.3	61.0
8	299°57.9	8°20.5	273°04.8	8.7	2°23.2	-14.3	60.9
9	314°58.1	8°19.5	287°32.5	8.7	2°08.9	-14.3	60.9
10	329°58.3	8°18.6	302°00.3	8.8	1°54.6	-14.3	60.9
11	344°58.5	8°17.7	316°28.1	8.8	1°40.3	-14.3	60.9
12	359°58.7	8°16.8	330°55.9	8.8	1°25.9	-14.3	60.8
13	14°58.9	8°15.9	345°23.8	8.9	1°11.6	-14.3	60.8
14	29°59.1	8°15.0	359°51.7	8.9	0°57.3	-14.3	60.8
15	44°59.3	8°14.1	14°19.6	9.0	0°43.0	-14.3	60.8
16	59°59.5	8°13.2	28°47.6	9.0	0°28.7	-14.3	60.7
17	74°59.7	8°12.3	43°15.6	9.0	0°14.4	-14.3	60.7
18	89°59.9	8°11.4	57°43.7	9.1	0°00.2	-14.3	60.7
19	105°00.1	8°10.5	72°11.7	9.1	-0°14.1	-14.3	60.7
20	120°00.3	8°09.6	86°39.8	9.1	-0°28.3	-14.2	60.6
21	135°00.5	8°08.7	101°08.0	9.1	-0°42.6	-14.2	60.6
22	150°00.7	8°07.8	115°36.1	9.2	-0°56.8	-14.2	60.6
23	165°00.9	8°06.8	130°04.3	9.2	-1°11.0	-14.2	60.6
	SD.=15.8	d=-0.9			S.D.=16.7		

Mon	**GHA**	**Dec**	**GHA**	**ν**	**Dec**	**d**	**HP**
0	180°01.1	8°05.9	144°32.5	9.2	-1°25.1	-14.2	60.5
1	195°01.3	8°05.0	159°00.8	9.3	-1°39.3	-14.1	60.5
2	210°01.5	8°04.1	173°29.0	9.3	-1°53.4	-14.1	60.5
3	225°01.7	8°03.2	187°57.3	9.3	-2°07.5	-14.1	60.4
4	240°01.9	8°02.3	202°25.7	9.3	-2°21.6	-14.1	60.4
5	255°02.1	8°01.4	216°54.0	9.4	-2°35.6	-14.0	60.4
6	270°02.3	8°00.5	231°22.4	9.4	-2°49.6	-14.0	60.4
7	285°02.5	7°59.6	245°50.8	9.4	-3°03.6	-14.0	60.3
8	300°02.7	7°58.7	260°19.2	9.4	-3°17.6	-13.9	60.3
9	315°02.9	7°57.7	274°47.7	9.5	-3°31.5	-13.9	60.3
10	330°03.1	7°56.8	289°16.1	9.5	-3°45.3	-13.9	60.2
11	345°03.3	7°55.9	303°44.6	9.5	-3°59.2	-13.8	60.2
12	0°03.5	7°55.0	318°13.1	9.5	-4°13.0	-13.8	60.2
13	15°03.7	7°54.1	332°41.6	9.5	-4°26.8	-13.7	60.1
14	30°03.9	7°53.2	347°10.2	9.5	-4°40.5	-13.7	60.1
15	45°04.1	7°52.3	1°38.7	9.6	-4°54.2	-13.7	60.1
16	60°04.3	7°51.4	16°07.3	9.6	-5°07.8	-13.6	60.0
17	75°04.5	7°50.4	30°35.9	9.6	-5°21.4	-13.6	60.0
18	90°04.7	7°49.5	45°04.5	9.6	-5°34.9	-13.5	60.0
19	105°04.9	7°48.6	59°33.1	9.6	-5°48.4	-13.5	59.9
20	120°05.1	7°47.7	74°01.8	9.6	-6°01.8	-13.4	59.9
21	135°05.3	7°46.8	88°30.4	9.7	-6°15.2	-13.4	59.9
22	150°05.5	7°45.9	102°59.1	9.7	-6°28.6	-13.3	59.8
23	165°05.7	7°45.0	117°27.7	9.7	-6°41.9	-13.3	59.8
	SD.=15.8	d=-0.9			S.D.=16.5		

Tue	**GHA**	**Dec**	**GHA**	**ν**	**Dec**	**d**	**HP**
0	180°05.9	7°44.1	131°56.4	9.7	-6°55.1	-13.2	59.8
1	195°06.1	7°43.1	146°25.1	9.7	-7°08.3	-13.1	59.7
2	210°06.3	7°42.2	160°53.8	9.7	-7°21.4	-13.1	59.7
3	225°06.5	7°41.3	175°22.5	9.7	-7°34.4	-13.0	59.6
4	240°06.7	7°40.4	189°51.3	9.7	-7°47.4	-13.0	59.6
5	255°06.9	7°39.5	204°20.0	9.7	-8°00.4	-12.9	59.6
6	270°07.1	7°38.6	218°48.7	9.7	-8°13.3	-12.8	59.5
7	285°07.3	7°37.6	233°17.5	9.8	-8°26.1	-12.8	59.5
8	300°07.5	7°36.7	247°46.3	9.8	-8°38.8	-12.7	59.5
9	315°07.7	7°35.8	262°15.0	9.8	-8°51.5	-12.7	59.4
10	330°07.9	7°34.9	276°43.8	9.8	-9°04.1	-12.6	59.4
11	345°08.1	7°34.0	291°12.6	9.8	-9°16.7	-12.5	59.4
12	0°08.3	7°33.1	305°41.3	9.8	-9°29.1	-12.4	59.3
13	15°08.5	7°32.1	320°10.1	9.8	-9°41.6	-12.4	59.3
14	30°08.7	7°31.2	334°38.9	9.8	-9°53.9	-12.3	59.2
15	45°08.9	7°30.3	349°07.7	9.8	-10°06.2	-12.2	59.2
16	60°09.1	7°29.4	3°36.5	9.8	-10°18.4	-12.2	59.2
17	75°09.4	7°28.5	18°05.3	9.8	-10°30.5	-12.1	59.1
18	90°09.6	7°27.6	32°34.1	9.8	-10°42.5	-12.0	59.1
19	105°09.8	7°26.6	47°02.9	9.8	-10°54.5	-11.9	59.1
20	120°10.0	7°25.7	61°31.7	9.8	-11°06.4	-11.9	59.0
21	135°10.2	7°24.8	76°00.5	9.8	-11°18.2	-11.8	59.0
22	150°10.4	7°23.9	90°29.3	9.8	-11°29.9	-11.7	58.9
23	165°10.6	7°23.0	104°58.0	9.8	-11°41.6	-11.6	58.9
	SD.=15.9	d=-0.9			S.D.=16.3		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:36	04:05	19:51	21:18	–:–
70	00:38	03:03	04:18	19:39	20:52	23:23
68	01:37	03:23	04:28	19:29	20:33	22:15
66	02:14	03:39	04:37	19:20	20:18	21:41
64	02:39	03:52	04:45	19:13	20:05	21:17
62	02:58	04:02	04:51	19:07	19:55	20:59
60	03:13	04:11	04:56	19:02	19:46	20:44
58	03:26	04:19	05:01	18:57	19:39	20:31
56	03:37	04:26	05:05	18:53	19:32	20:21
54	03:46	04:32	05:09	18:49	19:26	20:12
52	03:54	04:37	05:13	18:46	19:21	20:04
50	04:01	04:42	05:16	18:43	19:16	19:57
45	04:16	04:52	05:23	18:36	19:06	19:42
40	04:27	05:01	05:28	18:31	18:58	19:31
35	04:37	05:07	05:33	18:26	18:52	19:22
30	04:44	05:13	05:37	18:22	18:46	19:15
20	04:56	05:22	05:45	18:15	18:37	19:03
10	05:05	05:30	05:51	18:09	18:30	18:55
0	05:11	05:36	05:57	18:03	18:24	18:48
-10	05:16	05:41	06:02	17:58	18:19	18:43
-20	05:20	05:46	06:08	17:52	18:14	18:40
-30	05:23	05:51	06:15	17:45	18:09	18:37
-35	05:24	05:53	06:18	17:42	18:07	18:37
-40	05:24	05:55	06:23	17:38	18:05	18:36
-45	05:24	05:58	06:27	17:33	18:02	18:36
-50	05:23	06:01	06:33	17:27	17:60	18:37
-52	05:23	06:02	06:36	17:25	17:59	18:38
-54	05:22	06:03	06:39	17:22	17:57	18:38
-56	05:22	06:04	06:42	17:19	17:56	18:39
-58	05:21	06:06	06:45	17:15	17:55	18:40
-60	05:19	06:07	06:49	17:11	17:53	18:42

	Moonrise			**Moonset**		
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	07:17	09:29	11:42	20:05	19:46	19:23
70	07:20	09:24	11:26	20:06	19:55	19:41
68	07:23	09:19	11:13	20:07	20:02	19:56
66	07:25	09:15	11:03	20:07	20:07	20:08
64	07:27	09:12	10:55	20:08	20:12	20:18
62	07:29	09:09	10:47	20:08	20:17	20:26
60	07:31	09:07	10:41	20:09	20:21	20:33
58	07:32	09:05	10:36	20:09	20:24	20:40
56	07:33	09:03	10:31	20:09	20:27	20:46
54	07:34	09:01	10:26	20:10	20:30	20:51
52	07:35	08:60	10:22	20:10	20:32	20:56
50	07:36	08:59	10:19	20:10	20:35	20:60
45	07:38	08:56	10:11	20:11	20:40	21:09
40	07:40	08:53	10:05	20:11	20:44	21:17
35	07:41	08:51	09:59	20:11	20:47	21:24
30	07:42	08:49	09:55	20:12	20:50	21:30
20	07:44	08:46	09:47	20:12	20:56	21:40
10	07:46	08:43	09:39	20:13	21:01	21:49
0	07:48	08:41	09:33	20:13	21:06	21:57
-10	07:50	08:38	09:26	20:14	21:10	22:06
-20	07:52	08:36	09:19	20:14	21:15	22:15
-30	07:54	08:33	09:11	20:14	21:21	22:25
-35	07:55	08:31	09:07	20:15	21:24	22:31
-40	07:57	08:29	09:02	20:15	21:28	22:38
-45	07:58	08:27	08:56	20:15	21:32	22:46
-50	08:00	08:24	08:49	20:15	21:37	22:56
-52	08:01	08:23	08:46	20:16	21:39	23:01
-54	08:02	08:22	08:42	20:16	21:42	23:06
-56	08:03	08:21	08:38	20:16	21:45	23:11
-58	08:04	08:19	08:34	20:16	21:48	23:17
-60	08:06	08:17	08:29	20:16	21:52	23:24

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	00:15	00:05	12:00	14:00	01:33	2(7%)
2	00:04	00:14	11:59	14:53	02:27	3(14%)
3	00:24	00:33	11:59	15:45	03:19	4(23%)

September 04, 05 ,06 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	342°49.5	174°20.7	6°28.7	180°14.8	8°33.6	88°42.1	-22°17.9	57°34.0	-22°28.1
1	357°52.0	189°20.3	6°27.5	195°15.8	8°33.0	103°44.4	-22°17.9	72°36.5	-22°28.1
2	12°54.5	204°19.9	6°26.3	210°16.8	8°32.4	118°46.7	-22°18.0	87°39.0	-22°28.1
3	27°56.9	219°19.5	6°25.0	225°17.8	8°31.8	133°49.0	-22°18.0	102°41.6	-22°28.1
4	42°59.4	234°19.1	6°23.8	240°18.7	8°31.2	148°51.2	-22°18.0	117°44.1	-22°28.1
5	58°01.9	249°18.7	6°22.6	255°19.7	8°30.5	163°53.5	-22°18.0	132°46.6	-22°28.1
6	73°04.3	264°18.3	6°21.4	270°20.7	8°29.9	178°55.8	-22°18.1	147°49.1	-22°28.2
7	88°06.8	279°17.9	6°20.2	285°21.7	8°29.3	193°58.1	-22°18.1	162°51.7	-22°28.2
8	103°09.3	294°17.5	6°18.9	300°22.6	8°28.7	209°00.3	-22°18.1	177°54.2	-22°28.2
9	118°11.7	309°17.1	6°17.7	315°23.6	8°28.1	224°02.6	-22°18.1	192°56.7	-22°28.2
10	133°14.2	324°16.7	6°16.5	330°24.6	8°27.5	239°04.9	-22°18.2	207°59.2	-22°28.2
11	148°16.6	339°16.3	6°15.3	345°25.6	8°26.9	254°07.2	-22°18.2	223°01.8	-22°28.2
12	163°19.1	354°15.9	6°14.0	0°26.6	8°26.3	269°09.4	-22°18.2	238°04.3	-22°28.2
13	178°21.6	9°15.5	6°12.8	15°27.5	8°25.6	284°11.7	-22°18.2	253°06.8	-22°28.2
14	193°24.0	24°15.1	6°11.6	30°28.5	8°25.0	299°14.0	-22°18.3	268°09.3	-22°28.2
15	208°26.5	39°14.7	6°10.4	45°29.5	8°24.4	314°16.3	-22°18.3	283°11.9	-22°28.2
16	223°29.0	54°14.3	6°09.2	60°30.5	8°23.8	329°18.5	-22°18.3	298°14.4	-22°28.3
17	238°31.4	69°13.9	6°07.9	75°31.4	8°23.2	344°20.8	-22°18.4	313°16.9	-22°28.3
18	253°33.9	84°13.4	6°06.7	90°32.4	8°22.6	359°23.1	-22°18.4	328°19.4	-22°28.3
19	268°36.4	99°13.0	6°05.5	105°33.4	8°22.0	14°25.3	-22°18.4	343°21.9	-22°28.3
20	283°38.8	114°12.6	6°04.3	120°34.4	8°21.3	29°27.6	-22°18.4	358°24.5	-22°28.3
21	298°41.3	129°12.2	6°03.0	135°35.3	8°20.7	44°29.9	-22°18.5	13°27.0	-22°28.3
22	313°43.7	144°11.8	6°01.8	150°36.3	8°20.1	59°32.1	-22°18.5	28°29.5	-22°28.3
23	328°46.2	159°11.4	6°00.6	165°37.3	8°19.5	74°34.4	-22°18.5	43°32.0	-22°28.3
	Mer.pass.:1:08:	v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.0		v2.5 d-0.0 m0.3	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	343°48.7	174°11.0	5°59.4	180°38.3	8°18.9	89°36.7	-22°18.5	58°34.5	-22°28.3
1	358°51.1	189°10.6	5°58.1	195°39.3	8°18.3	104°39.0	-22°18.6	73°37.1	-22°28.3
2	13°53.6	204°10.2	5°56.9	210°40.2	8°17.7	119°41.2	-22°18.6	88°39.6	-22°28.4
3	28°56.1	219°09.9	5°55.7	225°41.2	8°17.0	134°43.5	-22°18.6	103°42.1	-22°28.4
4	43°58.5	234°09.5	5°54.5	240°42.2	8°16.4	149°45.8	-22°18.7	118°44.6	-22°28.4
5	59°01.0	249°09.1	5°53.2	255°43.2	8°15.8	164°48.0	-22°18.7	133°47.2	-22°28.4
6	74°03.5	264°08.7	5°52.0	270°44.1	8°15.2	179°50.3	-22°18.7	148°49.7	-22°28.4
7	89°05.9	279°08.3	5°50.8	285°45.1	8°14.6	194°52.6	-22°18.7	163°52.2	-22°28.4
8	104°08.4	294°07.9	5°49.5	300°46.1	8°14.0	209°54.8	-22°18.8	178°54.7	-22°28.4
9	119°10.9	309°07.5	5°48.3	315°47.1	8°13.4	224°57.1	-22°18.8	193°57.2	-22°28.4
10	134°13.3	324°07.1	5°47.1	330°48.1	8°12.7	239°59.4	-22°18.8	208°59.8	-22°28.4
11	149°15.8	339°06.7	5°45.9	345°49.0	8°12.1	255°01.6	-22°18.8	224°02.3	-22°28.4
12	164°18.2	354°06.3	5°44.6	0°50.0	8°11.5	270°03.9	-22°18.9	239°04.8	-22°28.4
13	179°20.7	9°05.9	5°43.4	15°51.0	8°10.9	285°06.2	-22°18.9	254°07.3	-22°28.5
14	194°23.2	24°05.5	5°42.2	30°52.0	8°10.3	300°08.4	-22°18.9	269°09.8	-22°28.5
15	209°25.6	39°05.1	5°40.9	45°53.0	8°09.7	315°10.7	-22°18.9	284°12.3	-22°28.5
16	224°28.1	54°04.7	5°39.7	60°53.9	8°09.1	330°12.9	-22°19.0	299°14.9	-22°28.5
17	239°30.6	69°04.3	5°38.5	75°54.9	8°08.4	345°15.2	-22°19.0	314°17.4	-22°28.5
18	254°33.0	84°03.9	5°37.2	90°55.9	8°07.8	0°17.5	-22°19.0	329°19.9	-22°28.5
19	269°35.5	99°03.5	5°36.0	105°56.9	8°07.2	15°19.7	-22°19.1	344°22.4	-22°28.5
20	284°38.0	114°03.1	5°34.8	120°57.8	8°06.6	30°22.0	-22°19.1	359°24.9	-22°28.5
21	299°40.4	129°02.7	5°33.5	135°58.8	8°06.0	45°24.3	-22°19.1	14°27.5	-22°28.5
22	314°42.9	144°02.3	5°32.3	150°59.8	8°05.4	60°26.5	-22°19.1	29°30.0	-22°28.5
23	329°45.4	159°01.9	5°31.1	166°00.8	8°04.7	75°28.8	-22°19.2	44°32.5	-22°28.6
	Mer.pass.:1:04:	v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.0		v2.5 d-0.0 m0.3	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	344°47.8	174°01.5	5°29.8	181°01.8	8°04.1	90°31.0	-22°19.2	59°35.0	-22°28.6
1	359°50.3	189°01.1	5°28.6	196°02.7	8°03.5	105°33.3	-22°19.2	74°37.5	-22°28.6
2	14°52.7	204°00.7	5°27.4	211°03.7	8°02.9	120°35.6	-22°19.2	89°40.0	-22°28.6
3	29°55.2	219°00.3	5°26.1	226°04.7	8°02.3	135°37.8	-22°19.3	104°42.6	-22°28.6
4	44°57.7	233°59.9	5°24.9	241°05.7	8°01.7	150°40.1	-22°19.3	119°45.1	-22°28.6
5	60°00.1	248°59.5	5°23.7	256°06.7	8°01.1	165°42.4	-22°19.3	134°47.6	-22°28.6
6	75°02.6	263°59.2	5°22.4	271°07.6	8°00.4	180°44.6	-22°19.4	149°50.1	-22°28.6
7	90°05.1	278°58.8	5°21.2	286°08.6	7°59.8	195°46.9	-22°19.4	164°52.6	-22°28.6
8	105°07.5	293°58.4	5°20.0	301°09.6	7°59.2	210°49.1	-22°19.4	179°55.1	-22°28.6
9	120°10.0	308°58.0	5°18.7	316°10.6	7°58.6	225°51.4	-22°19.4	194°57.7	-22°28.6
10	135°12.5	323°57.6	5°17.5	331°11.6	7°58.0	240°53.6	-22°19.5	210°00.2	-22°28.7
11	150°14.9	338°57.2	5°16.3	346°12.5	7°57.4	255°55.9	-22°19.5	225°02.7	-22°28.7
12	165°17.4	353°56.8	5°15.0	1°13.5	7°56.7	270°58.2	-22°19.5	240°05.2	-22°28.7
13	180°19.8	8°56.4	5°13.8	16°14.5	7°56.1	286°00.4	-22°19.6	255°07.7	-22°28.7
14	195°22.3	23°56.0	5°12.6	31°15.5	7°55.5	301°02.7	-22°19.6	270°10.2	-22°28.7
15	210°24.8	38°55.6	5°11.3	46°16.5	7°54.9	316°04.9	-22°19.6	285°12.7	-22°28.7
16	225°27.2	53°55.2	5°10.1	61°17.4	7°54.3	331°07.2	-22°19.6	300°15.3	-22°28.7
17	240°29.7	68°54.8	5°08.9	76°18.4	7°53.7	346°09.4	-22°19.7	315°17.8	-22°28.7
18	255°32.2	83°54.5	5°07.6	91°19.4	7°53.0	1°11.7	-22°19.7	330°20.3	-22°28.7
19	270°34.6	98°54.1	5°06.4	106°20.4	7°52.4	16°14.0	-22°19.7	345°22.8	-22°28.7
20	285°37.1	113°53.7	5°05.1	121°21.4	7°51.8	31°16.2	-22°19.7	0°25.3	-22°28.7
21	300°39.6	128°53.3	5°03.9	136°22.3	7°51.2	46°18.5	-22°19.8	15°27.8	-22°28.8
22	315°42.0	143°52.9	5°02.7	151°23.3	7°50.6	61°20.7	-22°19.8	30°30.3	-22°28.8
23	330°44.5	158°52.5	5°01.4	166°24.3	7°49.9	76°23.0	-22°19.8	45°32.9	-22°28.8
	Mer.pass.:1:00:	v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.0		v2.5 d-0.0 m0.3	

Stars

	SHA	**Dec**
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.1	-42°11.9
Schedar	349°35.2	56°38.5
Diphda	348°51.2	-17°52.7
Achernar	335°23.1	-57°08.1
Hamal	327°55.8	23°33.2
Polaris	315°42.6	89°20.4
Akamar	315°14.9	-40°13.4
Menkar	314°10.4	4°10.0
Mirfak	308°34.1	49°55.5
Aldebaran	290°44.5	16°32.8
Rigel	281°08.0	-8°10.7
Capella	280°28.2	46°00.8
Bellatrix	278°27.5	6°22.0
Elnath	278°07.3	28°37.3
Alnilam	275°42.1	-1°11.4
Betelgeuse	270°56.8	7°24.6
Canopus	263°54.5	-52°42.1
Sirius	258°30.0	-16°44.3
Adara	255°09.4	-28°59.8
Procyon	244°55.4	5°10.7
Pollux	243°22.7	27°58.7
Avior	234°16.8	-59°34.1
Suhail	222°49.7	-43°30.5
Miaplacidus	221°39.7	-69°47.7
Alphard	217°52.2	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.9
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.2	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.4	55°51.5
Spica	158°27.0	-11°15.6
Alcaid	152°55.8	49°13.3
Hadar	148°42.3	-60°28.1
Menkent	148°02.8	-36°27.9
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.3	-60°55.0
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.6	74°04.9
Alphecca	126°07.5	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.0	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.0	51°29.6
Kaus Aust.	83°38.0	-34°22.4
Vega	80°35.9	38°48.4
Nunki	75°52.9	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.1	-56°40.3
Deneb	49°28.2	45°21.2
Enif	33°42.7	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/9/4	**SHA**	**Mer.pass**
Venus	191°31.2	12:23
Mars	197°25.3	11:58
Jupiter	105°52.6	18:02
Saturn	74°44.5	20:06

2019/9/5	**SHA**	**Mer.pass**
Venus	190°22.4	12:24
Mars	196°49.6	11:57
Jupiter	105°48.0	17:59
Saturn	74°45.9	20:02

2019/9/6	**SHA**	**Mer.pass**
Venus	189°13.7	12:24
Mars	196°13.9	11:55
Jupiter	105°43.2	17:55
Saturn	74°47.2	19:58

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°10.8	7°22.0	119°26.8	9.8	-11°53.2	-11.5	58.9
1	195°11.0	7°21.1	133°55.6	9.8	-12°04.6	-11.4	58.8
2	210°11.2	7°20.2	148°24.4	9.8	-12°16.1	-11.4	58.8
3	225°11.4	7°19.3	162°53.2	9.8	-12°27.4	-11.3	58.7
4	240°11.6	7°18.4	177°22.0	9.8	-12°38.6	-11.2	58.7
5	255°11.8	7°17.4	191°50.8	9.8	-12°49.8	-11.1	58.7
6	270°12.0	7°16.5	206°19.6	9.8	-13°00.8	-11.0	58.6
7	285°12.2	7°15.6	220°48.3	9.8	-13°11.8	-10.9	58.6
8	300°12.4	7°14.7	235°17.1	9.8	-13°22.7	-10.8	58.6
9	315°12.6	7°13.8	249°45.9	9.8	-13°33.5	-10.8	58.5
10	330°12.8	7°12.8	264°14.6	9.8	-13°44.2	-10.7	58.5
11	345°13.0	7°11.9	278°43.4	9.8	-13°54.8	-10.6	58.4
12	0°13.2	7°11.0	293°12.1	9.7	-14°05.4	-10.5	58.4
13	15°13.5	7°10.1	307°40.9	9.7	-14°15.8	-10.4	58.4
14	30°13.7	7°09.2	322°09.6	9.7	-14°26.2	-10.3	58.3
15	45°13.9	7°08.2	336°38.4	9.7	-14°36.4	-10.2	58.3
16	60°14.1	7°07.3	351°07.1	9.7	-14°46.6	-10.1	58.2
17	75°14.3	7°06.4	5°35.8	9.7	-14°56.6	-10.0	58.2
18	90°14.5	7°05.5	20°04.5	9.7	-15°06.6	-9.9	58.2
19	105°14.7	7°04.5	34°33.2	9.7	-15°16.4	-9.8	58.1
20	120°14.9	7°03.6	49°02.0	9.7	-15°26.2	-9.7	58.1
21	135°15.1	7°02.7	63°30.6	9.7	-15°35.9	-9.6	58.1
22	150°15.3	7°01.8	77°59.3	9.7	-15°45.5	-9.5	58.0
23	165°15.5	7°00.8	92°28.0	9.7	-15°54.9	-9.4	58.0
	SD.=15.9	d=-0.9			S.D.=16.1		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	180°15.7	6°59.9	106°56.7	9.7	-16°04.3	-9.3	57.9
1	195°15.9	6°59.0	121°25.4	9.7	-16°13.6	-9.2	57.9
2	210°16.1	6°58.1	135°54.0	9.7	-16°22.8	-9.1	57.9
3	225°16.4	6°57.1	150°22.7	9.7	-16°31.8	-9.0	57.8
4	240°16.6	6°56.2	164°51.3	9.6	-16°40.8	-8.9	57.8
5	255°16.8	6°55.3	179°20.0	9.6	-16°49.6	-8.8	57.7
6	270°17.0	6°54.4	193°48.6	9.6	-16°58.4	-8.7	57.7
7	285°17.2	6°53.4	208°17.2	9.6	-17°07.1	-8.6	57.7
8	300°17.4	6°52.5	222°45.9	9.6	-17°15.6	-8.5	57.6
9	315°17.6	6°51.6	237°14.5	9.6	-17°24.1	-8.4	57.6
10	330°17.8	6°50.7	251°43.1	9.6	-17°32.4	-8.3	57.6
11	345°18.0	6°49.7	266°11.7	9.6	-17°40.6	-8.2	57.5
12	0°18.2	6°48.8	280°40.3	9.6	-17°48.7	-8.1	57.5
13	15°18.4	6°47.9	295°08.8	9.6	-17°56.8	-8.0	57.4
14	30°18.6	6°47.0	309°37.4	9.6	-18°04.7	-7.9	57.4
15	45°18.9	6°46.0	324°06.0	9.6	-18°12.5	-7.7	57.4
16	60°19.1	6°45.1	338°34.6	9.6	-18°20.2	-7.6	57.3
17	75°19.3	6°44.2	353°03.1	9.6	-18°27.7	-7.5	57.3
18	90°19.5	6°43.3	7°31.7	9.6	-18°35.2	-7.4	57.3
19	105°19.7	6°42.3	22°00.2	9.5	-18°42.6	-7.3	57.2
20	120°19.9	6°41.4	36°28.8	9.5	-18°49.8	-7.2	57.2
21	135°20.1	6°40.5	50°57.3	9.5	-18°56.9	-7.1	57.2
22	150°20.3	6°39.5	65°25.8	9.5	-19°04.0	-7.0	57.1
23	165°20.5	6°38.6	79°54.4	9.5	-19°10.9	-6.9	57.1
	SD.=15.9	d=-0.9			S.D.=15.8		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°20.7	6°37.7	94°22.9	9.5	-19°17.7	-6.7	57.1
1	195°21.0	6°36.8	108°51.4	9.5	-19°24.4	-6.6	57.0
2	210°21.2	6°35.8	123°19.9	9.5	-19°30.9	-6.5	57.0
3	225°21.4	6°34.9	137°48.4	9.5	-19°37.4	-6.4	56.9
4	240°21.6	6°34.0	152°16.9	9.5	-19°43.8	-6.3	56.9
5	255°21.8	6°33.0	166°45.4	9.5	-19°50.0	-6.2	56.9
6	270°22.0	6°32.1	181°13.9	9.5	-19°56.1	-6.1	56.8
7	285°22.2	6°31.2	195°42.4	9.5	-20°02.1	-5.9	56.8
8	300°22.4	6°30.2	210°10.9	9.5	-20°08.0	-5.8	56.8
9	315°22.6	6°29.3	224°39.4	9.5	-20°13.8	-5.7	56.7
10	330°22.9	6°28.4	239°07.9	9.5	-20°19.4	-5.6	56.7
11	345°23.1	6°27.5	253°36.4	9.5	-20°25.0	-5.5	56.7
12	0°23.3	6°26.5	268°04.9	9.5	-20°30.4	-5.4	56.6
13	15°23.5	6°25.6	282°33.4	9.5	-20°35.7	-5.2	56.6
14	30°23.7	6°24.7	297°01.9	9.5	-20°40.9	-5.1	56.6
15	45°23.9	6°23.7	311°30.4	9.5	-20°46.0	-5.0	56.5
16	60°24.1	6°22.8	325°58.9	9.5	-20°50.9	-4.9	56.5
17	75°24.3	6°21.9	340°27.4	9.5	-20°55.8	-4.8	56.5
18	90°24.5	6°20.9	354°55.8	9.5	-21°00.5	-4.7	56.4
19	105°24.8	6°20.0	9°24.3	9.5	-21°05.1	-4.5	56.4
20	120°25.0	6°19.1	23°52.9	9.5	-21°09.6	-4.4	56.4
21	135°25.2	6°18.1	38°21.4	9.5	-21°13.9	-4.3	56.3
22	150°25.4	6°17.2	52°49.9	9.5	-21°18.2	-4.2	56.3
23	165°25.6	6°16.3	67°18.4	9.5	-21°22.3	-4.1	56.3
	SD.=15.9	d=-0.9			S.D.=15.6		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	–:–	02:56	04:19	19:35	20:57	–:–
70	01:13	03:19	04:30	19:24	20:35	22:34
68	02:01	03:36	04:39	19:16	20:18	21:51
66	02:31	03:50	04:47	19:08	20:05	21:23
64	02:52	04:02	04:53	19:02	19:54	21:02
62	03:09	04:11	04:59	18:57	19:44	20:46
60	03:23	04:19	05:03	18:53	19:36	20:32
58	03:34	04:26	05:08	18:49	19:30	20:21
56	03:44	04:32	05:11	18:45	19:24	20:12
54	03:53	04:38	05:15	18:42	19:18	20:03
52	03:60	04:43	05:18	18:39	19:14	19:56
50	04:07	04:47	05:20	18:36	19:09	19:50
45	04:20	04:56	05:26	18:30	19:00	19:36
40	04:31	05:04	05:31	18:26	18:53	19:26
35	04:39	05:10	05:35	18:22	18:47	19:18
30	04:46	05:15	05:39	18:18	18:42	19:11
20	04:57	05:23	05:45	18:12	18:34	19:00
10	05:05	05:29	05:51	18:07	18:28	18:53
0	05:11	05:35	05:56	18:02	18:23	18:47
-10	05:15	05:39	06:00	17:57	18:18	18:43
-20	05:18	05:43	06:05	17:52	18:15	18:40
-30	05:19	05:47	06:11	17:47	18:11	18:39
-35	05:20	05:49	06:14	17:44	18:09	18:39
-40	05:19	05:51	06:18	17:40	18:08	18:39
-45	05:19	05:53	06:22	17:36	18:06	18:40
-50	05:17	05:54	06:27	17:32	18:04	18:41
-52	05:16	05:55	06:29	17:29	18:03	18:42
-54	05:15	05:56	06:31	17:27	18:03	18:43
-56	05:14	05:57	06:34	17:24	18:02	18:45
-58	05:13	05:58	06:37	17:22	18:01	18:46
-60	05:11	05:59	06:40	17:18	18:00	18:48

		Moonrise			Moonset	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	14:04	–:–	–:–	18:50	–:–	–:–
70	13:31	15:51	–:–	19:24	18:54	–:–
68	13:08	15:04	17:08	19:49	19:41	19:27
66	12:50	14:34	16:15	20:09	20:12	20:21
64	12:35	14:12	15:42	20:25	20:35	20:53
62	12:23	13:54	15:18	20:38	20:54	21:18
60	12:12	13:39	14:59	20:49	21:09	21:37
58	12:03	13:27	14:44	20:59	21:22	21:53
56	11:55	13:16	14:31	21:07	21:33	22:06
54	11:48	13:07	14:19	21:15	21:43	22:18
52	11:42	12:58	14:09	21:22	21:52	22:29
50	11:37	12:51	13:60	21:28	22:00	22:38
45	11:24	12:35	13:41	21:41	22:17	22:58
40	11:15	12:22	13:25	21:52	22:31	23:14
35	11:06	12:10	13:12	22:02	22:43	23:27
30	10:59	12:01	13:01	22:10	22:53	23:39
20	10:46	11:44	12:41	22:25	23:11	23:59
10	10:35	11:30	12:24	22:37	23:27	–:–
0	10:24	11:16	12:08	22:49	23:41	–:–
-10	10:14	11:03	11:53	23:01	23:56	–:–
-20	10:03	10:49	11:36	23:14	–:–	00:12
-30	09:51	10:33	11:17	23:29	–:–	00:30
-35	09:44	10:23	11:06	23:37	–:–	00:40
-40	09:36	10:13	10:53	23:47	–:–	00:52
-45	09:27	10:00	10:38	23:58	–:–	01:07
-50	09:15	09:45	10:20	–:–	00:12	01:24
-52	09:10	09:38	10:11	–:–	00:19	01:32
-54	09:05	09:30	10:02	–:–	00:26	01:42
-56	08:58	09:22	09:51	–:–	00:34	01:52
-58	08:51	09:12	09:39	–:–	00:43	02:04
-60	08:43	09:01	09:24	–:–	00:54	02:18

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	00:43	00:53	11:59	16:36	04:10	5(33%)
5	01:03	01:13	11:58	17:28	05:02	6(43%)
6	01:23	01:33	11:58	18:21	05:54	7(54%)

September 07, 08 ,09 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	345°47.0	173°52.1	5°00.2	181°25.3	7°49.3	91°25.2	-22°19.9	60°35.4	-22°28.8
1	0°49.4	188°51.7	4°58.9	196°26.3	7°48.7	106°27.5	-22°19.9	75°37.9	-22°28.8
2	15°51.9	203°51.3	4°57.7	211°27.2	7°48.1	121°29.7	-22°19.9	90°40.4	-22°28.8
3	30°54.3	218°50.9	4°56.5	226°28.2	7°47.5	136°32.0	-22°19.9	105°42.9	-22°28.8
4	45°56.8	233°50.6	4°55.2	241°29.2	7°46.9	151°34.2	-22°20.0	120°45.4	-22°28.8
5	60°59.3	248°50.2	4°54.0	256°30.2	7°46.2	166°36.5	-22°20.0	135°47.9	-22°28.8
6	76°01.7	263°49.8	4°52.7	271°31.2	7°45.6	181°38.7	-22°20.0	150°50.4	-22°28.8
7	91°04.2	278°49.4	4°51.5	286°32.1	7°45.0	196°41.0	-22°20.1	165°53.0	-22°28.8
8	106°06.7	293°49.0	4°50.3	301°33.1	7°44.4	211°43.3	-22°20.1	180°55.5	-22°28.9
9	121°09.1	308°48.6	4°49.0	316°34.1	7°43.8	226°45.5	-22°20.1	195°58.0	-22°28.9
10	136°11.6	323°48.2	4°47.8	331°35.1	7°43.1	241°47.8	-22°20.1	211°00.5	-22°28.9
11	151°14.1	338°47.8	4°46.5	346°36.1	7°42.5	256°50.0	-22°20.2	226°03.0	-22°28.9
12	166°16.5	353°47.4	4°45.3	1°37.1	7°41.9	271°52.3	-22°20.2	241°05.5	-22°28.9
13	181°19.0	8°47.1	4°44.1	16°38.0	7°41.3	286°54.5	-22°20.2	256°08.0	-22°28.9
14	196°21.5	23°46.7	4°42.8	31°39.0	7°40.7	301°56.8	-22°20.3	271°10.5	-22°28.9
15	211°23.9	38°46.3	4°41.6	46°40.0	7°40.0	316°59.0	-22°20.3	286°13.0	-22°28.9
16	226°26.4	53°45.9	4°40.3	61°41.0	7°39.4	332°01.3	-22°20.3	301°15.5	-22°28.9
17	241°28.8	68°45.5	4°39.1	76°42.0	7°38.8	347°03.5	-22°20.3	316°18.1	-22°28.9
18	256°31.3	83°45.1	4°37.8	91°42.9	7°38.2	2°05.8	-22°20.4	331°20.6	-22°28.9
19	271°33.8	98°44.7	4°36.6	106°43.9	7°37.6	17°08.0	-22°20.4	346°23.1	-22°29.0
20	286°36.2	113°44.3	4°35.4	121°44.9	7°37.0	32°10.2	-22°20.4	1°25.6	-22°29.0
21	301°38.7	128°44.0	4°34.1	136°45.9	7°36.3	47°12.5	-22°20.5	16°28.1	-22°29.0
22	316°41.2	143°43.6	4°32.9	151°46.9	7°35.7	62°14.7	-22°20.5	31°30.6	-22°29.0
23	331°43.6	158°43.2	4°31.6	166°47.8	7°35.1	77°17.0	-22°20.5	46°33.1	-22°29.0
Mer.pass.:0:56:	v-0.4 d-1.2 m-3.8			v1.0 d-0.6 m1.7		v2.3 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	346°46.1	173°42.8	4°30.4	181°48.8	7°34.5	92°19.2	-22°20.5	61°35.6	-22°29.0
1	1°48.6	188°42.4	4°29.1	196°49.8	7°33.9	107°21.5	-22°20.6	76°38.1	-22°29.0
2	16°51.0	203°42.0	4°27.9	211°50.8	7°33.2	122°23.7	-22°20.6	91°40.6	-22°29.0
3	31°53.5	218°41.6	4°26.6	226°51.8	7°32.6	137°26.0	-22°20.6	106°43.1	-22°29.0
4	46°56.0	233°41.3	4°25.4	241°52.8	7°32.0	152°28.2	-22°20.7	121°45.7	-22°29.0
5	61°58.4	248°40.9	4°24.1	256°53.7	7°31.4	167°30.5	-22°20.7	136°48.2	-22°29.0
6	77°00.9	263°40.5	4°22.9	271°54.7	7°30.8	182°32.7	-22°20.7	151°50.7	-22°29.0
7	92°03.3	278°40.1	4°21.7	286°55.7	7°30.1	197°35.0	-22°20.7	166°53.2	-22°29.1
8	107°05.8	293°39.7	4°20.4	301°56.7	7°29.5	212°37.2	-22°20.8	181°55.7	-22°29.1
9	122°08.3	308°39.3	4°19.2	316°57.7	7°28.9	227°39.4	-22°20.8	196°58.2	-22°29.1
10	137°10.7	323°39.0	4°17.9	331°58.7	7°28.3	242°41.7	-22°20.8	212°00.7	-22°29.1
11	152°13.2	338°38.6	4°16.7	346°59.6	7°27.6	257°43.9	-22°20.9	227°03.2	-22°29.1
12	167°15.7	353°38.2	4°15.4	2°00.6	7°27.0	272°46.2	-22°20.9	242°05.7	-22°29.1
13	182°18.1	8°37.8	4°14.2	17°01.6	7°26.4	287°48.4	-22°20.9	257°08.2	-22°29.1
14	197°20.6	23°37.4	4°12.9	32°02.6	7°25.8	302°50.7	-22°20.9	272°10.7	-22°29.1
15	212°23.1	38°37.0	4°11.7	47°03.6	7°25.2	317°52.9	-22°21.0	287°13.2	-22°29.1
16	227°25.5	53°36.7	4°10.4	62°04.5	7°24.5	332°55.1	-22°21.0	302°15.7	-22°29.1
17	242°28.0	68°36.3	4°09.2	77°05.5	7°23.9	347°57.4	-22°21.0	317°18.2	-22°29.1
18	257°30.4	83°35.9	4°07.9	92°06.5	7°23.3	2°59.6	-22°21.1	332°20.7	-22°29.1
19	272°32.9	98°35.5	4°06.7	107°07.5	7°22.7	18°01.9	-22°21.1	347°23.3	-22°29.2
20	287°35.4	113°35.1	4°05.4	122°08.5	7°22.1	33°04.1	-22°21.1	2°25.8	-22°29.2
21	302°37.8	128°34.7	4°04.2	137°09.5	7°21.4	48°06.3	-22°21.1	17°28.3	-22°29.2
22	317°40.3	143°34.4	4°02.9	152°10.4	7°20.8	63°08.6	-22°21.2	32°30.8	-22°29.2
23	332°42.8	158°34.0	4°01.7	167°11.4	7°20.2	78°10.8	-22°21.2	47°33.3	-22°29.2
Mer.pass.:0:52:	v-0.4 d-1.2 m-3.8			v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	347°45.2	173°33.6	4°00.4	182°12.4	7°19.6	93°13.1	-22°21.2	62°35.8	-22°29.2
1	2°47.7	188°33.2	3°59.2	197°13.4	7°18.9	108°15.3	-22°21.3	77°38.3	-22°29.2
2	17°50.2	203°32.8	3°57.9	212°14.4	7°18.3	123°17.5	-22°21.3	92°40.8	-22°29.2
3	32°52.6	218°32.5	3°56.7	227°15.4	7°17.7	138°19.8	-22°21.3	107°43.3	-22°29.2
4	47°55.1	233°32.1	3°55.4	242°16.3	7°17.1	153°22.0	-22°21.4	122°45.8	-22°29.2
5	62°57.6	248°31.7	3°54.2	257°17.3	7°16.5	168°24.3	-22°21.4	137°48.3	-22°29.2
6	78°00.0	263°31.3	3°52.9	272°18.3	7°15.8	183°26.5	-22°21.4	152°50.8	-22°29.2
7	93°02.5	278°30.9	3°51.7	287°19.3	7°15.2	198°28.7	-22°21.4	167°53.3	-22°29.3
8	108°04.9	293°30.5	3°50.4	302°20.3	7°14.6	213°31.0	-22°21.5	182°55.8	-22°29.3
9	123°07.4	308°30.2	3°49.2	317°21.3	7°14.0	228°33.2	-22°21.5	197°58.3	-22°29.3
10	138°09.9	323°29.8	3°47.9	332°22.2	7°13.3	243°35.4	-22°21.5	213°00.8	-22°29.3
11	153°12.3	338°29.4	3°46.7	347°23.2	7°12.7	258°37.7	-22°21.6	228°03.3	-22°29.3
12	168°14.8	353°29.0	3°45.4	2°24.2	7°12.1	273°39.9	-22°21.6	243°05.8	-22°29.3
13	183°17.3	8°28.6	3°44.2	17°25.2	7°11.5	288°42.1	-22°21.6	258°08.3	-22°29.3
14	198°19.7	23°28.3	3°42.9	32°26.2	7°10.9	303°44.4	-22°21.6	273°10.8	-22°29.3
15	213°22.2	38°27.9	3°41.7	47°27.2	7°10.2	318°46.6	-22°21.7	288°13.3	-22°29.3
16	228°24.7	53°27.5	3°40.4	62°28.2	7°09.6	333°48.9	-22°21.7	303°15.8	-22°29.3
17	243°27.1	68°27.1	3°39.2	77°29.1	7°09.0	348°51.1	-22°21.7	318°18.3	-22°29.3
18	258°29.6	83°26.8	3°37.9	92°30.1	7°08.4	3°53.3	-22°21.8	333°20.8	-22°29.3
19	273°32.1	98°26.4	3°36.6	107°31.1	7°07.7	18°55.6	-22°21.8	348°23.3	-22°29.4
20	288°34.5	113°26.0	3°35.4	122°32.1	7°07.1	33°57.8	-22°21.8	3°25.8	-22°29.4
21	303°37.0	128°25.6	3°34.1	137°33.1	7°06.5	49°00.0	-22°21.9	18°28.3	-22°29.4
22	318°39.4	143°25.2	3°32.9	152°34.1	7°05.9	64°02.3	-22°21.9	33°30.8	-22°29.4
23	333°41.9	158°24.9	3°31.6	167°35.0	7°05.2	79°04.5	-22°21.9	48°33.3	-22°29.4
Mer.pass.:0:48:	v-0.4 d-1.3 m-3.8			v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Stars	SHA	Dec
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.1	-42°11.9
Schedar	349°35.2	56°38.6
Diphda	348°51.2	-17°52.7
Achernar	335°23.1	-57°08.1
Hamal	327°55.7	23°33.2
Polaris	315°41.1	89°20.4
Akamar	315°14.9	-40°13.4
Menkar	314°10.4	4°10.0
Mirfak	308°34.0	49°55.6
Aldebaran	290°44.5	16°32.8
Rigel	281°08.0	-8°10.7
Capella	280°28.2	46°00.8
Bellatrix	278°27.5	6°22.0
Elnath	278°07.3	28°37.3
Alnilam	275°42.1	-1°11.4
Betelgeuse	270°56.8	7°24.6
Canopus	263°54.4	-52°42.1
Sirius	258°30.0	-16°44.3
Adara	255°09.3	-28°59.8
Procyon	244°55.4	5°10.7
Pollux	243°22.7	27°58.7
Avior	234°16.8	-59°34.1
Suhail	222°49.7	-43°30.5
Miaplacidus	221°39.7	-69°47.7
Alphard	217°52.2	-8°44.5
Regulus	207°39.3	11°52.4
Dubhe	193°47.1	61°38.8
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.2	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.4	55°51.5
Spica	158°27.0	-11°15.6
Alcaid	152°55.8	49°13.3
Hadar	148°42.3	-60°28.0
Menkent	148°02.8	-36°27.9
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.3	-60°55.0
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.7	74°04.9
Alphecca	126°07.5	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.0	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.0	51°29.6
Kaus Aust.	83°38.0	-34°22.4
Vega	80°35.9	38°48.4
Nunki	75°52.9	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.1	-56°40.3
Deneb	49°28.2	45°21.3
Enif	33°42.7	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/9/7	SHA	Mer.pass
Venus	188°05.2	12:25
Mars	195°38.3	11:54
Jupiter	105°38.3	17:52
Saturn	74°48.4	19:54

2019/9/8	SHA	Mer.pass
Venus	186°56.7	12:25
Mars	195°02.7	11:52
Jupiter	105°33.1	17:48
Saturn	74°49.5	19:50

2019/9/9	SHA	Mer.pass
Venus	185°48.4	12:26
Mars	194°27.2	11:50
Jupiter	105°27.8	17:44
Saturn	74°50.5	19:46

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	180°25.8	6°15.3	81°46.9	9.5	-21°26.3	-4.0	56.3
1	195°26.0	6°14.4	96°15.4	9.5	-21°30.2	-3.8	56.2
2	210°26.2	6°13.5	110°44.0	9.5	-21°34.0	-3.7	56.2
3	225°26.5	6°12.5	125°12.5	9.5	-21°37.7	-3.6	56.2
4	240°26.7	6°11.6	139°41.1	9.6	-21°41.2	-3.5	56.1
5	255°26.9	6°10.7	154°09.6	9.6	-21°44.6	-3.4	56.1
6	270°27.1	6°09.7	168°38.2	9.6	-21°47.9	-3.2	56.1
7	285°27.3	6°08.8	183°06.8	9.6	-21°51.1	-3.1	56.0
8	300°27.5	6°07.9	197°35.3	9.6	-21°54.2	-3.0	56.0
9	315°27.7	6°06.9	212°03.9	9.6	-21°57.1	-2.9	56.0
10	330°27.9	6°06.0	226°32.5	9.6	-21°60.0	-2.8	56.0
11	345°28.2	6°05.1	241°01.2	9.6	-22°02.7	-2.7	55.9
12	0°28.4	6°04.1	255°29.8	9.6	-22°05.3	-2.5	55.9
13	15°28.6	6°03.2	269°58.4	9.6	-22°07.7	-2.4	55.9
14	30°28.8	6°02.3	284°27.1	9.7	-22°10.1	-2.3	55.8
15	45°29.0	6°01.3	298°55.8	9.7	-22°12.3	-2.2	55.8
16	60°29.2	6°00.4	313°24.4	9.7	-22°14.5	-2.1	55.8
17	75°29.4	5°59.5	327°53.1	9.7	-22°16.5	-1.9	55.8
18	90°29.7	5°58.5	342°21.9	9.7	-22°18.3	-1.8	55.7
19	105°29.9	5°57.6	356°50.6	9.7	-22°20.1	-1.7	55.7
20	120°30.1	5°56.6	11°19.3	9.8	-22°21.7	-1.6	55.7
21	135°30.3	5°55.7	25°48.1	9.8	-22°23.3	-1.5	55.6
22	150°30.5	5°54.8	40°16.9	9.8	-22°24.7	-1.4	55.6
23	165°30.7	5°53.8	54°45.7	9.8	-22°26.0	-1.2	55.6
	SD.=15.9	d=-0.9			S.D.=15.3		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	180°30.9	5°52.9	69°14.5	9.8	-22°27.1	-1.1	55.6
1	195°31.2	5°52.0	83°43.4	9.9	-22°28.2	-1.0	55.5
2	210°31.4	5°51.0	98°12.2	9.9	-22°29.1	-0.9	55.5
3	225°31.6	5°50.1	112°41.1	9.9	-22°30.0	-0.8	55.5
4	240°31.8	5°49.1	127°10.0	9.9	-22°30.7	-0.6	55.5
5	255°32.0	5°48.2	141°39.0	9.9	-22°31.3	-0.5	55.4
6	270°32.2	5°47.3	156°07.9	10.0	-22°31.7	-0.4	55.4
7	285°32.5	5°46.3	170°36.9	10.0	-22°32.1	-0.3	55.4
8	300°32.7	5°45.4	185°05.9	10.0	-22°32.3	-0.2	55.4
9	315°32.9	5°44.5	199°34.9	10.0	-22°32.5	-0.1	55.3
10	330°33.1	5°43.5	214°04.0	10.1	-22°32.5	0.0	55.3
11	345°33.3	5°42.6	228°33.1	10.1	-22°32.4	0.2	55.3
12	0°33.5	5°41.6	243°02.2	10.1	-22°32.2	0.3	55.3
13	15°33.7	5°40.7	257°31.3	10.2	-22°31.8	0.4	55.2
14	30°34.0	5°39.8	272°00.5	10.2	-22°31.4	0.5	55.2
15	45°34.2	5°38.8	286°29.7	10.2	-22°30.8	0.6	55.2
16	60°34.4	5°37.9	300°58.9	10.2	-22°30.1	0.7	55.2
17	75°34.6	5°36.9	315°28.2	10.3	-22°29.4	0.8	55.2
18	90°34.8	5°36.0	329°57.5	10.3	-22°28.5	1.0	55.1
19	105°35.0	5°35.1	344°26.8	10.3	-22°27.5	1.1	55.1
20	120°35.3	5°34.1	358°56.1	10.4	-22°26.3	1.2	55.1
21	135°35.5	5°33.2	13°25.5	10.4	-22°25.1	1.3	55.1
22	150°35.7	5°32.2	27°55.0	10.4	-22°23.7	1.4	55.1
23	165°35.9	5°31.3	42°24.4	10.5	-22°22.3	1.5	55.0
	SD.=15.9	d=-0.9			S.D.=15.2		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	180°36.1	5°30.4	56°53.9	10.5	-22°20.7	1.6	55.0
1	195°36.3	5°29.4	71°23.4	10.5	-22°19.0	1.7	55.0
2	210°36.6	5°28.5	85°53.0	10.6	-22°17.2	1.8	55.0
3	225°36.8	5°27.5	100°22.6	10.6	-22°15.3	2.0	54.9
4	240°37.0	5°26.6	114°52.2	10.6	-22°13.3	2.1	54.9
5	255°37.2	5°25.6	129°21.9	10.7	-22°11.2	2.2	54.9
6	270°37.4	5°24.7	143°51.6	10.7	-22°09.0	2.3	54.9
7	285°37.6	5°23.8	158°21.3	10.8	-22°06.7	2.4	54.9
8	300°37.9	5°22.8	172°51.1	10.8	-22°04.2	2.5	54.9
9	315°38.1	5°21.9	187°20.9	10.8	-22°01.7	2.6	54.8
10	330°38.3	5°20.9	201°50.8	10.9	-21°59.0	2.7	54.8
11	345°38.5	5°20.0	216°20.7	10.9	-21°56.3	2.8	54.8
12	0°38.7	5°19.0	230°50.6	11.0	-21°53.4	2.9	54.8
13	15°38.9	5°18.1	245°20.6	11.0	-21°50.4	3.0	54.8
14	30°39.2	5°17.2	259°50.6	11.0	-21°47.4	3.1	54.7
15	45°39.4	5°16.2	274°20.7	11.1	-21°44.2	3.2	54.7
16	60°39.6	5°15.3	288°50.8	11.1	-21°40.9	3.3	54.7
17	75°39.8	5°14.3	303°20.9	11.2	-21°37.5	3.4	54.7
18	90°40.0	5°13.4	317°51.1	11.2	-21°34.0	3.5	54.7
19	105°40.3	5°12.4	332°21.3	11.3	-21°30.4	3.6	54.7
20	120°40.5	5°11.5	346°51.6	11.3	-21°26.8	3.7	54.6
21	135°40.7	5°10.6	1°21.9	11.3	-21°23.0	3.8	54.6
22	150°40.9	5°09.6	15°52.3	11.4	-21°19.1	3.9	54.6
23	165°41.1	5°08.7	30°22.7	11.4	-21°15.1	4.0	54.6
	SD.=15.9	d=-0.9			S.D.=15.0		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	00:25	03:14	04:33	19:19	20:37	23:05
70	01:45	03:34	04:43	19:10	20:18	22:03
68	02:21	03:49	04:50	19:03	20:03	21:29
66	02:46	04:01	04:57	18:57	19:52	21:06
64	03:05	04:11	05:02	18:52	19:42	20:48
62	03:20	04:20	05:07	18:47	19:34	20:33
60	03:32	04:27	05:11	18:43	19:27	20:21
58	03:42	04:33	05:14	18:40	19:21	20:11
56	03:51	04:39	05:17	18:37	19:15	20:02
54	03:59	04:44	05:20	18:34	19:11	19:55
52	04:06	04:48	05:23	18:32	19:06	19:48
50	04:12	04:52	05:25	18:30	19:03	19:42
45	04:24	04:60	05:30	18:25	18:55	19:30
40	04:34	05:06	05:34	18:21	18:48	19:21
35	04:42	05:12	05:37	18:17	18:43	19:13
30	04:48	05:16	05:41	18:15	18:39	19:07
20	04:58	05:24	05:46	18:09	18:32	18:57
10	05:05	05:29	05:50	18:05	18:26	18:51
0	05:10	05:34	05:55	18:01	18:22	18:46
-10	05:13	05:37	05:59	17:57	18:18	18:43
-20	05:15	05:41	06:03	17:53	18:15	18:41
-30	05:16	05:43	06:07	17:49	18:13	18:40
-35	05:15	05:45	06:10	17:46	18:11	18:41
-40	05:15	05:46	06:13	17:43	18:10	18:42
-45	05:13	05:47	06:16	17:40	18:09	18:43
-50	05:11	05:48	06:20	17:36	18:08	18:46
-52	05:10	05:49	06:22	17:34	18:08	18:47
-54	05:08	05:49	06:24	17:32	18:08	18:49
-56	05:06	05:49	06:26	17:30	18:07	18:50
-58	05:04	05:50	06:29	17:28	18:07	18:53
-60	05:02	05:50	06:31	17:25	18:07	18:55

Lat.	Moonrise Sat	Moonrise Sun	Moonrise Mon	Moonset Sat	Moonset Sun	Moonset Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	20:03	–:–	–:–	21:52
66	17:41	18:37	19:02	20:43	21:33	22:53
64	16:59	17:54	18:27	21:25	22:17	23:27
62	16:30	17:25	18:02	21:54	22:45	23:52
60	16:08	17:03	17:42	22:16	23:08	–:–
58	15:51	16:45	17:26	22:34	23:25	–:–
56	15:36	16:30	17:12	22:49	23:41	–:–
54	15:23	16:17	16:60	23:02	23:53	–:–
52	15:12	16:05	16:49	23:13	–:–	00:05
50	15:02	15:55	16:40	23:23	–:–	00:15
45	14:41	15:34	16:20	23:44	–:–	00:36
40	14:24	15:17	16:03	–:–	00:01	00:53
35	14:09	15:02	15:49	–:–	00:16	01:07
30	13:57	14:50	15:37	–:–	00:28	01:20
20	13:36	14:28	15:17	–:–	00:50	01:41
10	13:18	14:10	14:59	00:17	01:08	01:59
0	13:01	13:52	14:42	00:34	01:26	02:17
-10	12:44	13:35	14:26	00:50	01:43	02:34
-20	12:25	13:16	14:08	01:08	02:01	02:52
-30	12:05	12:55	13:47	01:28	02:23	03:13
-35	11:52	12:42	13:35	01:40	02:35	03:25
-40	11:38	12:28	13:21	01:54	02:50	03:39
-45	11:22	12:11	13:05	02:10	03:07	03:56
-50	11:01	11:50	12:45	02:30	03:28	04:17
-52	10:52	11:40	12:35	02:39	03:38	04:27
-54	10:41	11:28	12:24	02:50	03:49	04:38
-56	10:29	11:15	12:12	03:02	04:02	04:50
-58	10:14	11:00	11:57	03:16	04:17	05:05
-60	09:57	10:43	11:41	03:33	04:35	05:22

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
7	01:43	01:53	11:58	19:13	06:47	8(64%)
8	02:04	02:14	11:57	20:04	07:38	9(73%)
9	02:24	02:35	11:57	20:54	08:29	10(81%)

September 10, 11 ,12 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	348°44.4	173°24.5	3°30.4	182°36.0	7°04.6	94°06.7	-22°21.9	63°35.8	-22°29.4
1	3°46.8	188°24.1	3°29.1	197°37.0	7°04.0	109°08.9	-22°22.0	78°38.3	-22°29.4
2	18°49.3	203°23.7	3°27.9	212°38.0	7°03.4	124°11.2	-22°22.0	93°40.8	-22°29.4
3	33°51.8	218°23.3	3°26.6	227°39.0	7°02.8	139°13.4	-22°22.0	108°43.3	-22°29.4
4	48°54.2	233°23.0	3°25.4	242°40.0	7°02.1	154°15.6	-22°22.1	123°45.8	-22°29.4
5	63°56.7	248°22.6	3°24.1	257°40.9	7°01.5	169°17.9	-22°22.1	138°48.3	-22°29.4
6	78°59.2	263°22.2	3°22.8	272°41.9	7°00.9	184°20.1	-22°22.1	153°50.8	-22°29.4
7	94°01.6	278°21.8	3°21.6	287°42.9	7°00.3	199°22.3	-22°22.2	168°53.3	-22°29.4
8	109°04.1	293°21.5	3°20.3	302°43.9	6°59.6	214°24.6	-22°22.2	183°55.8	-22°29.5
9	124°06.6	308°21.1	3°19.1	317°44.9	6°59.0	229°26.8	-22°22.2	198°58.3	-22°29.5
10	139°09.0	323°20.7	3°17.8	332°45.9	6°58.4	244°29.0	-22°22.2	214°00.8	-22°29.5
11	154°11.5	338°20.3	3°16.6	347°46.9	6°57.8	259°31.2	-22°22.3	229°03.3	-22°29.5
12	169°13.9	353°20.0	3°15.3	2°47.8	6°57.1	274°33.5	-22°22.3	244°05.8	-22°29.5
13	184°16.4	8°19.6	3°14.0	17°48.8	6°56.5	289°35.7	-22°22.3	259°08.3	-22°29.5
14	199°18.9	23°19.2	3°12.8	32°49.8	6°55.9	304°37.9	-22°22.4	274°10.8	-22°29.5
15	214°21.3	38°18.8	3°11.5	47°50.8	6°55.3	319°40.2	-22°22.4	289°13.3	-22°29.5
16	229°23.8	53°18.4	3°10.3	62°51.8	6°54.6	334°42.4	-22°22.4	304°15.8	-22°29.5
17	244°26.3	68°18.1	3°09.0	77°52.8	6°54.0	349°44.6	-22°22.5	319°18.3	-22°29.5
18	259°28.7	83°17.7	3°07.8	92°53.7	6°53.4	4°46.8	-22°22.5	334°20.8	-22°29.5
19	274°31.2	98°17.3	3°06.5	107°54.7	6°52.8	19°49.1	-22°22.5	349°23.3	-22°29.5
20	289°33.7	113°16.9	3°05.2	122°55.7	6°52.1	34°51.3	-22°22.5	4°25.8	-22°29.5
21	304°36.1	128°16.6	3°04.0	137°56.7	6°51.5	49°53.5	-22°22.6	19°28.3	-22°29.6
22	319°38.6	143°16.2	3°02.7	152°57.7	6°50.9	64°55.7	-22°22.6	34°30.8	-22°29.6
23	334°41.0	158°15.8	3°01.5	167°58.7	6°50.3	79°58.0	-22°22.6	49°33.3	-22°29.6
Mer.pass.:0:44:	v-0.4 d-1.3 m-3.8			v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	349°43.5	173°15.4	3°00.2	182°59.7	6°49.6	95°00.2	-22°22.7	64°35.8	-22°29.6
1	4°46.0	188°15.1	2°58.9	198°00.6	6°49.0	110°02.4	-22°22.7	79°38.3	-22°29.6
2	19°48.4	203°14.7	2°57.7	213°01.6	6°48.4	125°04.6	-22°22.7	94°40.8	-22°29.6
3	34°50.9	218°14.3	2°56.4	228°02.6	6°47.8	140°06.9	-22°22.8	109°43.3	-22°29.6
4	49°53.4	233°13.9	2°55.2	243°03.6	6°47.1	155°09.1	-22°22.8	124°45.8	-22°29.6
5	64°55.8	248°13.6	2°53.9	258°04.6	6°46.5	170°11.3	-22°22.8	139°48.2	-22°29.6
6	79°58.3	263°13.2	2°52.6	273°05.6	6°45.9	185°13.5	-22°22.8	154°50.7	-22°29.6
7	95°00.8	278°12.8	2°51.4	288°06.6	6°45.3	200°15.8	-22°22.9	169°53.2	-22°29.6
8	110°03.2	293°12.4	2°50.1	303°07.5	6°44.6	215°18.0	-22°22.9	184°55.7	-22°29.6
9	125°05.7	308°12.1	2°48.9	318°08.5	6°44.0	230°20.2	-22°22.9	199°58.2	-22°29.6
10	140°08.2	323°11.7	2°47.6	333°09.5	6°43.4	245°22.4	-22°23.0	215°00.7	-22°29.6
11	155°10.6	338°11.3	2°46.3	348°10.5	6°42.8	260°24.7	-22°23.0	230°03.2	-22°29.7
12	170°13.1	353°10.9	2°45.1	3°11.5	6°42.1	275°26.9	-22°23.0	245°05.7	-22°29.7
13	185°15.5	8°10.6	2°43.8	18°12.5	6°41.5	290°29.1	-22°23.1	260°08.2	-22°29.7
14	200°18.0	23°10.2	2°42.6	33°13.5	6°40.9	305°31.3	-22°23.1	275°10.7	-22°29.7
15	215°20.5	38°09.8	2°41.3	48°14.4	6°40.2	320°33.5	-22°23.1	290°13.2	-22°29.7
16	230°22.9	53°09.4	2°40.0	63°15.4	6°39.6	335°35.8	-22°23.2	305°15.7	-22°29.7
17	245°25.4	68°09.1	2°38.8	78°16.4	6°39.0	350°38.0	-22°23.2	320°18.2	-22°29.7
18	260°27.9	83°08.7	2°37.5	93°17.4	6°38.4	5°40.2	-22°23.2	335°20.7	-22°29.7
19	275°30.3	98°08.3	2°36.3	108°18.4	6°37.7	20°42.4	-22°23.2	350°23.2	-22°29.7
20	290°32.8	113°08.0	2°35.0	123°19.4	6°37.1	35°44.6	-22°23.3	5°25.7	-22°29.7
21	305°35.3	128°07.6	2°33.7	138°20.4	6°36.5	50°46.8	-22°23.3	20°28.1	-22°29.7
22	320°37.7	143°07.2	2°32.5	153°21.4	6°35.9	65°49.1	-22°23.3	35°30.6	-22°29.7
23	335°40.2	158°06.8	2°31.2	168°22.3	6°35.2	80°51.3	-22°23.4	50°33.1	-22°29.7
Mer.pass.:0:40:	v-0.4 d-1.3 m-3.8			v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	350°42.6	173°06.5	2°29.9	183°23.3	6°34.6	95°53.5	-22°23.4	65°35.6	-22°29.7
1	5°45.1	188°06.1	2°28.7	198°24.3	6°34.0	110°55.7	-22°23.4	80°38.1	-22°29.8
2	20°47.6	203°05.7	2°27.4	213°25.3	6°33.3	125°57.9	-22°23.5	95°40.6	-22°29.8
3	35°50.0	218°05.3	2°26.2	228°26.3	6°32.7	141°00.2	-22°23.5	110°43.1	-22°29.8
4	50°52.5	233°05.0	2°24.9	243°27.3	6°32.1	156°02.4	-22°23.5	125°45.6	-22°29.8
5	65°55.0	248°04.6	2°23.6	258°28.3	6°31.5	171°04.6	-22°23.6	140°48.1	-22°29.8
6	80°57.4	263°04.2	2°22.4	273°29.2	6°30.8	186°06.8	-22°23.6	155°50.6	-22°29.8
7	95°59.9	278°03.9	2°21.1	288°30.2	6°30.2	201°09.0	-22°23.6	170°53.1	-22°29.8
8	111°02.4	293°03.5	2°19.8	303°31.2	6°29.6	216°11.2	-22°23.6	185°55.5	-22°29.8
9	126°04.8	308°03.1	2°18.6	318°32.2	6°29.0	231°13.5	-22°23.7	200°58.0	-22°29.8
10	141°07.3	323°02.7	2°17.3	333°33.2	6°28.3	246°15.7	-22°23.7	216°00.5	-22°29.8
11	156°09.8	338°02.4	2°16.0	348°34.2	6°27.7	261°17.9	-22°23.7	231°03.0	-22°29.8
12	171°12.2	353°02.0	2°14.8	3°35.2	6°27.1	276°20.1	-22°23.8	246°05.5	-22°29.8
13	186°14.7	8°01.6	2°13.5	18°36.2	6°26.4	291°22.3	-22°23.8	261°08.0	-22°29.8
14	201°17.1	23°01.3	2°12.2	33°37.1	6°25.8	306°24.5	-22°23.8	276°10.5	-22°29.8
15	216°19.6	38°00.9	2°11.0	48°38.1	6°25.2	321°26.7	-22°23.9	291°13.0	-22°29.8
16	231°22.1	53°00.5	2°09.7	63°39.1	6°24.6	336°28.9	-22°23.9	306°15.5	-22°29.9
17	246°24.5	68°00.1	2°08.4	78°40.1	6°23.9	351°31.2	-22°23.9	321°17.9	-22°29.9
18	261°27.0	82°59.8	2°07.2	93°41.1	6°23.3	6°33.4	-22°24.0	336°20.4	-22°29.9
19	276°29.5	97°59.4	2°05.9	108°42.1	6°22.7	21°35.6	-22°24.0	351°22.9	-22°29.9
20	291°31.9	112°59.0	2°04.7	123°43.1	6°22.0	36°37.8	-22°24.0	6°25.4	-22°29.9
21	306°34.4	127°58.7	2°03.4	138°44.1	6°21.4	51°40.0	-22°24.0	21°27.9	-22°29.9
22	321°36.9	142°58.3	2°02.1	153°45.0	6°20.8	66°42.2	-22°24.1	36°30.4	-22°29.9
23	336°39.3	157°57.9	2°00.9	168°46.0	6°20.2	81°44.4	-22°24.1	51°32.9	-22°29.9
Mer.pass.:0:37:	v-0.4 d-1.3 m-3.8			v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Stars

Star	SHA	Dec
Alpheratz	357°38.8	29°11.9
Ankaa	353°11.0	-42°11.9
Schedar	349°35.2	56°38.6
Diphda	348°51.2	-17°52.7
Achernar	335°23.1	-57°08.1
Hamal	327°55.7	23°33.2
Polaris	315°39.8	89°20.5
Akamar	315°14.8	-40°13.4
Menkar	314°10.4	4°10.0
Mirfak	308°34.0	49°55.6
Aldebaran	290°44.4	16°32.8
Rigel	281°07.9	-8°10.7
Capella	280°28.2	46°00.8
Bellatrix	278°27.4	6°22.0
Elnath	278°07.2	28°37.3
Alnilam	275°42.1	-1°11.3
Betelgeuse	270°56.7	7°24.6
Canopus	263°54.4	-52°42.1
Sirius	258°30.0	-16°44.3
Adara	255°09.3	-28°59.8
Procyon	244°55.4	5°10.7
Pollux	243°22.6	27°58.7
Avior	234°16.8	-59°34.1
Suhail	222°49.7	-43°30.5
Miaplacidus	221°39.7	-69°47.7
Alphard	217°52.2	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.1	61°38.8
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.3	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.4	55°51.5
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.3
Hadar	148°42.3	-60°28.0
Menkent	148°02.8	-36°27.9
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.4	-60°55.0
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.7	74°04.9
Alphecca	126°07.5	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.1	-69°03.8
Sabik	102°07.6	-15°44.8
Shaula	96°16.1	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.1	51°29.6
Kaus Aust.	83°38.0	-34°22.4
Vega	80°36.0	38°48.4
Nunki	75°52.9	-26°16.2
Altair	62°03.9	8°55.4
Peacock	53°12.1	-56°40.4
Deneb	49°28.2	45°21.3
Enif	33°42.7	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/9/1	SHA	Mer.pass
Venus	184°40.1	12:27
Mars	193°51.7	11:49
Jupiter	105°22.3	17:41
Saturn	74°51.5	19:42

2019/9/1	SHA	Mer.pass
Venus	183°31.9	12:27
Mars	193°16.2	11:47
Jupiter	105°16.7	17:37
Saturn	74°52.3	19:38

2019/9/1	SHA	Mer.pass
Venus	182°23.8	12:28
Mars	192°40.7	11:46
Jupiter	105°10.9	17:34
Saturn	74°53.0	19:34

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°41.3	5°07.7	44°53.2	11.5	-21°11.0	4.1	54.6
1	195°41.6	5°06.8	59°23.7	11.5	-21°06.8	4.2	54.6
2	210°41.8	5°05.8	73°54.2	11.6	-21°02.5	4.3	54.5
3	225°42.0	5°04.9	88°24.8	11.6	-20°58.1	4.4	54.5
4	240°42.2	5°03.9	102°55.4	11.7	-20°53.7	4.5	54.5
5	255°42.4	5°03.0	117°26.1	11.7	-20°49.1	4.6	54.5
6	270°42.7	5°02.0	131°56.8	11.8	-20°44.4	4.7	54.5
7	285°42.9	5°01.1	146°27.6	11.8	-20°39.7	4.8	54.5
8	300°43.1	5°00.2	160°58.4	11.8	-20°34.8	4.9	54.5
9	315°43.3	4°59.2	175°29.3	11.9	-20°29.8	5.0	54.4
10	330°43.5	4°58.3	190°00.2	11.9	-20°24.8	5.1	54.4
11	345°43.8	4°57.3	204°31.2	12.0	-20°19.6	5.2	54.4
12	0°44.0	4°56.4	219°02.2	12.0	-20°14.4	5.3	54.4
13	15°44.2	4°55.4	233°33.3	12.1	-20°09.1	5.4	54.4
14	30°44.4	4°54.5	248°04.4	12.1	-20°03.7	5.5	54.4
15	45°44.6	4°53.5	262°35.5	12.2	-19°58.2	5.6	54.4
16	60°44.9	4°52.6	277°06.7	12.2	-19°52.6	5.6	54.4
17	75°45.1	4°51.6	291°38.0	12.3	-19°46.9	5.7	54.3
18	90°45.3	4°50.7	306°09.3	12.3	-19°41.1	5.8	54.3
19	105°45.5	4°49.7	320°40.7	12.4	-19°35.2	5.9	54.3
20	120°45.7	4°48.8	335°12.1	12.4	-19°29.3	6.0	54.3
21	135°45.9	4°47.8	349°43.5	12.5	-19°23.3	6.1	54.3
22	150°46.2	4°46.9	4°15.0	12.5	-19°17.1	6.2	54.3
23	165°46.4	4°45.9	18°46.5	12.6	-19°10.9	6.2	54.3
	SD.=15.9	d=-0.9			S.D.=14.9		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°46.6	4°45.0	33°18.1	12.6	-19°04.6	6.3	54.3
1	195°46.8	4°44.1	47°49.8	12.7	-18°58.3	6.4	54.3
2	210°47.0	4°43.1	62°21.5	12.7	-18°51.8	6.5	54.2
3	225°47.3	4°42.2	76°53.2	12.8	-18°45.3	6.6	54.2
4	240°47.5	4°41.2	91°25.0	12.8	-18°38.7	6.7	54.2
5	255°47.7	4°40.3	105°56.8	12.9	-18°32.0	6.7	54.2
6	270°47.9	4°39.3	120°28.7	12.9	-18°25.2	6.8	54.2
7	285°48.1	4°38.4	135°00.7	13.0	-18°18.3	6.9	54.2
8	300°48.4	4°37.4	149°32.6	13.0	-18°11.4	7.0	54.2
9	315°48.6	4°36.5	164°04.7	13.1	-18°04.3	7.1	54.2
10	330°48.8	4°35.5	178°36.8	13.1	-17°57.2	7.1	54.2
11	345°49.0	4°34.6	193°08.9	13.2	-17°50.1	7.2	54.2
12	0°49.3	4°33.6	207°41.1	13.2	-17°42.8	7.3	54.2
13	15°49.5	4°32.7	222°13.3	13.3	-17°35.5	7.4	54.1
14	30°49.7	4°31.7	236°45.6	13.3	-17°28.1	7.4	54.1
15	45°49.9	4°30.8	251°17.9	13.3	-17°20.6	7.5	54.1
16	60°50.1	4°29.8	265°50.3	13.4	-17°13.1	7.6	54.1
17	75°50.4	4°28.9	280°22.7	13.4	-17°05.4	7.7	54.1
18	90°50.6	4°27.9	294°55.1	13.5	-16°57.7	7.7	54.1
19	105°50.8	4°27.0	309°27.7	13.5	-16°50.0	7.8	54.1
20	120°51.0	4°26.0	324°00.2	13.6	-16°42.1	7.9	54.1
21	135°51.2	4°25.1	338°32.8	13.6	-16°34.2	7.9	54.1
22	150°51.5	4°24.1	353°05.5	13.7	-16°26.2	8.0	54.1
23	165°51.7	4°23.2	7°38.2	13.7	-16°18.2	8.1	54.1
	SD.=15.9	d=-0.9			S.D.=14.8		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°51.9	4°22.2	22°10.9	13.8	-16°10.1	8.2	54.1
1	195°52.1	4°21.2	36°43.7	13.8	-16°01.9	8.2	54.1
2	210°52.3	4°20.3	51°16.5	13.9	-15°53.6	8.3	54.1
3	225°52.6	4°19.3	65°49.4	13.9	-15°45.3	8.4	54.1
4	240°52.8	4°18.4	80°22.4	13.9	-15°36.9	8.4	54.0
5	255°53.0	4°17.4	94°55.3	14.0	-15°28.5	8.5	54.0
6	270°53.2	4°16.5	109°28.3	14.0	-15°20.0	8.5	54.0
7	285°53.5	4°15.5	124°01.4	14.1	-15°11.4	8.6	54.0
8	300°53.7	4°14.6	138°34.5	14.1	-15°02.7	8.7	54.0
9	315°53.9	4°13.6	153°07.6	14.2	-14°54.0	8.7	54.0
10	330°54.1	4°12.7	167°40.8	14.2	-14°45.3	8.8	54.0
11	345°54.3	4°11.7	182°14.1	14.3	-14°36.5	8.9	54.0
12	0°54.6	4°10.8	196°47.3	14.3	-14°27.6	8.9	54.0
13	15°54.8	4°09.8	211°20.7	14.3	-14°18.6	9.0	54.0
14	30°55.0	4°08.9	225°54.0	14.4	-14°09.6	9.0	54.0
15	45°55.2	4°07.9	240°27.4	14.4	-14°00.6	9.1	54.0
16	60°55.4	4°07.0	255°00.9	14.5	-13°51.4	9.1	54.0
17	75°55.7	4°06.0	269°34.3	14.5	-13°42.3	9.2	54.0
18	90°55.9	4°05.1	284°07.9	14.5	-13°33.0	9.3	54.0
19	105°56.1	4°04.1	298°41.4	14.6	-13°23.8	9.3	54.0
20	120°56.3	4°03.1	313°15.0	14.6	-13°14.4	9.4	54.0
21	135°56.6	4°02.2	327°48.7	14.7	-13°05.0	9.4	54.0
22	150°56.8	4°01.2	342°22.3	14.7	-12°55.6	9.5	54.0
23	165°57.0	4°00.3	356°56.1	14.7	-12°46.1	9.5	54.0
	SD.=15.9	d=-1.0			S.D.=14.8		

Lat.	**Twilight** Naut.	Civil	Sunrise	Sunset	**Twilight** Civil	Naut.
72	01:23	03:32	04:47	19:03	20:18	22:19
70	02:10	03:48	04:55	18:56	20:02	21:37
68	02:39	04:01	05:01	18:50	19:49	21:10
66	02:60	04:12	05:06	18:45	19:39	20:50
64	03:16	04:21	05:11	18:41	19:30	20:34
62	03:30	04:28	05:14	18:38	19:23	20:21
60	03:41	04:35	05:18	18:34	19:17	20:10
58	03:50	04:40	05:20	18:32	19:12	20:01
56	03:58	04:45	05:23	18:29	19:07	19:53
54	04:05	04:49	05:25	18:27	19:03	19:47
52	04:11	04:53	05:27	18:25	18:59	19:41
50	04:17	04:56	05:29	18:23	18:56	19:35
45	04:28	05:04	05:33	18:19	18:49	19:24
40	04:37	05:09	05:37	18:16	18:43	19:15
35	04:44	05:14	05:40	18:13	18:39	19:09
30	04:50	05:18	05:42	18:11	18:35	19:03
20	04:59	05:24	05:46	18:07	18:29	18:55
10	05:05	05:29	05:50	18:03	18:24	18:49
0	05:09	05:33	05:53	17:60	18:21	18:45
-10	05:11	05:36	05:57	17:57	18:18	18:42
-20	05:12	05:38	06:00	17:54	18:16	18:41
-30	05:12	05:40	06:04	17:50	18:14	18:42
-35	05:11	05:41	06:06	17:48	18:13	18:43
-40	05:10	05:41	06:08	17:46	18:13	18:44
-45	05:08	05:42	06:11	17:43	18:13	18:47
-50	05:04	05:42	06:14	17:40	18:13	18:50
-52	05:03	05:42	06:15	17:39	18:13	18:52
-54	05:01	05:42	06:17	17:38	18:13	18:54
-56	04:58	05:42	06:19	17:36	18:13	18:56
-58	04:56	05:41	06:20	17:34	18:13	18:59
-60	04:53	05:41	06:22	17:32	18:14	19:02

Lat.	**Moonrise** Tue	Wed	Thu	**Moonset** Tue	Wed	Thu
72	–:–	20:54	20:14	–:–	–:–	00:18
70	20:47	20:08	19:50	22:48	–:–	01:03
68	19:46	19:37	19:31	23:49	–:–	01:33
66	19:11	19:15	19:16	–:–	00:23	01:54
64	18:46	18:57	19:03	–:–	00:48	02:12
62	18:26	18:42	18:52	–:–	01:07	02:26
60	18:10	18:29	18:43	00:11	01:23	02:38
58	17:56	18:18	18:35	00:27	01:36	02:48
56	17:44	18:09	18:28	00:41	01:47	02:57
54	17:34	18:00	18:22	00:53	01:58	03:05
52	17:24	17:53	18:16	01:03	02:06	03:12
50	17:16	17:46	18:11	01:13	02:14	03:18
45	16:58	17:31	17:60	01:32	02:31	03:32
40	16:44	17:19	17:50	01:48	02:45	03:43
35	16:32	17:09	17:42	02:01	02:57	03:53
30	16:21	16:60	17:35	02:13	03:07	04:01
20	16:02	16:44	17:23	02:33	03:24	04:15
10	15:46	16:30	17:12	02:50	03:40	04:28
0	15:31	16:18	17:02	03:06	03:54	04:39
-10	15:16	16:05	16:52	03:22	04:08	04:51
-20	14:60	15:51	16:41	03:39	04:23	05:03
-30	14:41	15:35	16:29	03:59	04:40	05:17
-35	14:30	15:26	16:21	04:10	04:50	05:25
-40	14:18	15:15	16:13	04:23	05:01	05:34
-45	14:03	15:03	16:03	04:38	05:14	05:45
-50	13:45	14:47	15:52	04:57	05:30	05:58
-52	13:36	14:40	15:46	05:06	05:38	06:04
-54	13:26	14:32	15:40	05:16	05:46	06:10
-56	13:15	14:24	15:34	05:27	05:56	06:18
-58	13:03	14:13	15:26	05:40	06:06	06:26
-60	12:48	14:02	15:17	05:55	06:18	06:35

Day	**Sun** Eqn.of Time 00^h	12^h	Mer. Pass	**Moon** Mer.Pass. Upper	Lower	Age
10	02:45	02:56	11:57	21:42	09:18	11(88%)
11	03:06	03:17	11:56	22:28	10:05	12(94%)
12	03:28	03:38	11:56	23:12	10:50	13(97%)

September 13, 14 ,15 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	351°41.8	172°57.5	1°59.6	183°47.0	6°19.5	96°46.6	-22°24.1	66°35.4	-22°29.9
1	6°44.3	187°57.2	1°58.3	198°48.0	6°18.9	111°48.9	-22°24.2	81°37.8	-22°29.9
2	21°46.7	202°56.8	1°57.1	213°49.0	6°18.3	126°51.1	-22°24.2	96°40.3	-22°29.9
3	36°49.2	217°56.4	1°55.8	228°50.0	6°17.6	141°53.3	-22°24.2	111°42.8	-22°29.9
4	51°51.6	232°56.1	1°54.5	243°51.0	6°17.0	156°55.5	-22°24.3	126°45.3	-22°29.9
5	66°54.1	247°55.7	1°53.3	258°52.0	6°16.4	171°57.7	-22°24.3	141°47.8	-22°29.9
6	81°56.6	262°55.3	1°52.0	273°52.9	6°15.8	186°59.9	-22°24.3	156°50.3	-22°29.9
7	96°59.0	277°55.0	1°50.7	288°53.9	6°15.1	202°02.1	-22°24.4	171°52.8	-22°30.0
8	112°01.5	292°54.6	1°49.5	303°54.9	6°14.5	217°04.3	-22°24.4	186°55.2	-22°30.0
9	127°04.0	307°54.2	1°48.2	318°55.9	6°13.9	232°06.5	-22°24.4	201°57.7	-22°30.0
10	142°06.4	322°53.8	1°46.9	333°56.9	6°13.2	247°08.7	-22°24.5	217°00.2	-22°30.0
11	157°08.9	337°53.5	1°45.7	348°57.9	6°12.6	262°10.9	-22°24.5	232°02.7	-22°30.0
12	172°11.4	352°53.1	1°44.4	3°58.9	6°12.0	277°13.1	-22°24.5	247°05.2	-22°30.0
13	187°13.8	7°52.7	1°43.1	18°59.9	6°11.4	292°15.4	-22°24.6	262°07.7	-22°30.0
14	202°16.3	22°52.4	1°41.9	34°00.8	6°10.7	307°17.6	-22°24.6	277°10.2	-22°30.0
15	217°18.7	37°52.0	1°40.6	49°01.8	6°10.1	322°19.8	-22°24.6	292°12.6	-22°30.0
16	232°21.2	52°51.6	1°39.3	64°02.8	6°09.5	337°22.0	-22°24.6	307°15.1	-22°30.0
17	247°23.7	67°51.3	1°38.0	79°03.8	6°08.8	352°24.2	-22°24.7	322°17.6	-22°30.0
18	262°26.1	82°50.9	1°36.8	94°04.8	6°08.2	7°26.4	-22°24.7	337°20.1	-22°30.0
19	277°28.6	97°50.5	1°35.5	109°05.8	6°07.6	22°28.6	-22°24.7	352°22.6	-22°30.0
20	292°31.1	112°50.1	1°34.2	124°06.8	6°06.9	37°30.8	-22°24.8	7°25.1	-22°30.0
21	307°33.5	127°49.8	1°33.0	139°07.8	6°06.3	52°33.0	-22°24.8	22°27.5	-22°30.0
22	322°36.0	142°49.4	1°31.7	154°08.7	6°05.7	67°35.2	-22°24.8	37°30.0	-22°30.0
23	337°38.5	157°49.0	1°30.4	169°09.7	6°05.1	82°37.4	-22°24.9	52°32.5	-22°30.1
Mer.pass.:0:33:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	352°40.9	172°48.7	1°29.2	184°10.7	6°04.4	97°39.6	-22°24.9	67°35.0	-22°30.1
1	7°43.4	187°48.3	1°27.9	199°11.7	6°03.8	112°41.8	-22°24.9	82°37.5	-22°30.1
2	22°45.9	202°47.9	1°26.6	214°12.7	6°03.2	127°44.0	-22°25.0	97°40.0	-22°30.1
3	37°48.3	217°47.6	1°25.4	229°13.7	6°02.5	142°46.2	-22°25.0	112°42.4	-22°30.1
4	52°50.8	232°47.2	1°24.1	244°14.7	6°01.9	157°48.4	-22°25.0	127°44.9	-22°30.1
5	67°53.2	247°46.8	1°22.8	259°15.7	6°01.3	172°50.6	-22°25.1	142°47.4	-22°30.1
6	82°55.7	262°46.5	1°21.6	274°16.7	6°00.6	187°52.8	-22°25.1	157°49.9	-22°30.1
7	97°58.2	277°46.1	1°20.3	289°17.6	6°00.0	202°55.0	-22°25.1	172°52.4	-22°30.1
8	113°00.6	292°45.7	1°19.0	304°18.6	5°59.4	217°57.2	-22°25.2	187°54.9	-22°30.1
9	128°03.1	307°45.4	1°17.7	319°19.6	5°58.7	232°59.4	-22°25.2	202°57.3	-22°30.1
10	143°05.6	322°45.0	1°16.5	334°20.6	5°58.1	248°01.6	-22°25.2	217°59.8	-22°30.1
11	158°08.0	337°44.6	1°15.2	349°21.6	5°57.5	263°03.8	-22°25.2	233°02.3	-22°30.1
12	173°10.5	352°44.3	1°13.9	4°22.6	5°56.9	278°06.0	-22°25.3	248°04.8	-22°30.1
13	188°13.0	7°43.9	1°12.7	19°23.6	5°56.2	293°08.2	-22°25.3	263°07.3	-22°30.1
14	203°15.4	22°43.5	1°11.4	34°24.6	5°55.6	308°10.4	-22°25.3	278°09.7	-22°30.1
15	218°17.9	37°43.1	1°10.1	49°25.6	5°55.0	323°12.6	-22°25.4	293°12.2	-22°30.1
16	233°20.3	52°42.8	1°08.9	64°26.5	5°54.3	338°14.8	-22°25.4	308°14.7	-22°30.2
17	248°22.8	67°42.4	1°07.6	79°27.5	5°53.7	353°17.0	-22°25.4	323°17.2	-22°30.2
18	263°25.3	82°42.0	1°06.3	94°28.5	5°53.1	8°19.2	-22°25.5	338°19.7	-22°30.2
19	278°27.7	97°41.7	1°05.0	109°29.5	5°52.4	23°21.4	-22°25.5	353°22.1	-22°30.2
20	293°30.2	112°41.3	1°03.8	124°30.5	5°51.8	38°23.6	-22°25.5	8°24.6	-22°30.2
21	308°32.7	127°40.9	1°02.5	139°31.5	5°51.2	53°25.8	-22°25.6	23°27.1	-22°30.2
22	323°35.1	142°40.6	1°01.2	154°32.5	5°50.5	68°28.0	-22°25.6	38°29.6	-22°30.2
23	338°37.6	157°40.2	0°60.0	169°33.5	5°49.9	83°30.2	-22°25.6	53°32.0	-22°30.2
Mer.pass.:0:29:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	353°40.1	172°39.8	0°58.7	184°34.5	5°49.3	98°32.4	-22°25.7	68°34.5	-22°30.2
1	8°42.5	187°39.5	0°57.4	199°35.4	5°48.6	113°34.6	-22°25.7	83°37.0	-22°30.2
2	23°45.0	202°39.1	0°56.1	214°36.4	5°48.0	128°36.8	-22°25.7	98°39.5	-22°30.2
3	38°47.5	217°38.7	0°54.9	229°37.4	5°47.4	143°39.0	-22°25.8	113°42.0	-22°30.2
4	53°49.9	232°38.4	0°53.6	244°38.4	5°46.7	158°41.2	-22°25.8	128°44.4	-22°30.2
5	68°52.4	247°38.0	0°52.3	259°39.4	5°46.1	173°43.4	-22°25.8	143°46.9	-22°30.2
6	83°54.8	262°37.6	0°51.1	274°40.4	5°45.5	188°45.6	-22°25.9	158°49.4	-22°30.2
7	98°57.3	277°37.3	0°49.8	289°41.4	5°44.8	203°47.8	-22°25.9	173°51.9	-22°30.2
8	113°59.8	292°36.9	0°48.5	304°42.4	5°44.2	218°50.0	-22°25.9	188°54.3	-22°30.2
9	129°02.2	307°36.5	0°47.2	319°43.4	5°43.6	233°52.2	-22°26.0	203°56.8	-22°30.2
10	144°04.7	322°36.2	0°46.0	334°44.3	5°42.9	248°54.4	-22°26.0	218°59.3	-22°30.3
11	159°07.2	337°35.8	0°44.7	349°45.3	5°42.3	263°56.6	-22°26.0	234°01.8	-22°30.3
12	174°09.6	352°35.4	0°43.4	4°46.3	5°41.7	278°58.7	-22°26.1	249°04.3	-22°30.3
13	189°12.1	7°35.1	0°42.2	19°47.3	5°41.0	294°00.9	-22°26.1	264°06.7	-22°30.3
14	204°14.6	22°34.7	0°40.9	34°48.3	5°40.4	309°03.1	-22°26.1	279°09.2	-22°30.3
15	219°17.0	37°34.3	0°39.6	49°49.3	5°39.8	324°05.3	-22°26.1	294°11.7	-22°30.3
16	234°19.5	52°34.0	0°38.3	64°50.3	5°39.2	339°07.5	-22°26.2	309°14.2	-22°30.3
17	249°21.9	67°33.6	0°37.1	79°51.3	5°38.5	354°09.7	-22°26.2	324°16.6	-22°30.3
18	264°24.4	82°33.2	0°35.8	94°52.3	5°37.9	9°11.9	-22°26.2	339°19.1	-22°30.3
19	279°26.9	97°32.9	0°34.5	109°53.3	5°37.3	24°14.1	-22°26.3	354°21.6	-22°30.3
20	294°29.3	112°32.5	0°33.2	124°54.2	5°36.6	39°16.3	-22°26.3	9°24.1	-22°30.3
21	309°31.8	127°32.1	0°32.0	139°55.2	5°36.0	54°18.5	-22°26.3	24°26.5	-22°30.3
22	324°34.3	142°31.8	0°30.7	154°56.2	5°35.4	69°20.7	-22°26.4	39°29.0	-22°30.3
23	339°36.7	157°31.4	0°29.4	169°57.2	5°34.7	84°22.9	-22°26.4	54°31.5	-22°30.3
Mer.pass.:0:25:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Stars

	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°11.9
Schedar	349°35.1	56°38.6
Diphda	348°51.2	-17°52.7
Achernar	335°23.1	-57°08.1
Hamal	327°55.7	23°33.2
Polaris	315°38.6	89°20.5
Akamar	315°14.8	-40°13.4
Menkar	314°10.4	4°10.0
Mirfak	308°34.0	49°55.6
Aldebaran	290°44.4	16°32.8
Rigel	281°07.9	-8°10.7
Capella	280°28.1	46°00.8
Bellatrix	278°27.4	6°22.0
Elnath	278°07.2	28°37.3
Alnilam	275°42.1	-1°11.3
Betelgeuse	270°56.7	7°24.6
Canopus	263°54.4	-52°42.1
Sirius	258°30.0	-16°44.3
Adara	255°09.3	-28°59.7
Procyon	244°55.4	5°10.7
Pollux	243°22.6	27°58.7
Avior	234°16.8	-59°34.1
Suhail	222°49.7	-43°30.5
Miaplacidus	221°39.7	-69°47.6
Alphard	217°52.2	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.1	61°38.8
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.9
Acrux	173°05.3	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.4	55°51.5
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.3
Hadar	148°42.3	-60°28.0
Menkent	148°02.9	-36°27.9
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.4	-60°55.0
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.8	74°04.9
Alphecca	126°07.6	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.1	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.1	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.1	51°29.6
Kaus Aust.	83°38.0	-34°22.4
Vega	80°36.0	38°48.4
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.1	-56°40.4
Deneb	49°28.3	45°21.3
Enif	33°42.7	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/9/1	SHA	Mer.pass
Venus	181°15.8	12:28
Mars	192°05.2	11:44
Jupiter	105°04.9	17:30
Saturn	74°53.6	19:30

2019/9/1	SHA	Mer.pass
Venus	180°07.7	12:29
Mars	191°29.8	11:43
Jupiter	104°58.7	17:27
Saturn	74°54.1	19:26

2019/9/1	SHA	Mer.pass
Venus	178°59.8	12:30
Mars	190°54.4	11:41
Jupiter	104°52.3	17:23
Saturn	74°54.5	19:22

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	180°57.2	3°59.3	11°29.8	14.8	-12°36.5	9.6	54.0
1	195°57.4	3°58.4	26°03.6	14.8	-12°26.9	9.6	54.0
2	210°57.7	3°57.4	40°37.4	14.8	-12°17.3	9.7	54.0
3	225°57.9	3°56.5	55°11.3	14.9	-12°07.6	9.7	54.0
4	240°58.1	3°55.5	69°45.2	14.9	-11°57.8	9.8	54.0
5	255°58.3	3°54.6	84°19.1	15.0	-11°48.0	9.8	54.0
6	270°58.6	3°53.6	98°53.1	15.0	-11°38.2	9.9	54.0
7	285°58.8	3°52.6	113°27.1	15.0	-11°28.3	9.9	54.0
8	300°59.0	3°51.7	128°01.1	15.1	-11°18.4	10.0	54.0
9	315°59.2	3°50.7	142°35.2	15.1	-11°08.4	10.0	54.0
10	330°59.5	3°49.8	157°09.3	15.1	-10°58.3	10.1	54.0
11	345°59.7	3°48.8	171°43.4	15.2	-10°48.3	10.1	54.0
12	0°59.9	3°47.9	186°17.6	15.2	-10°38.2	10.1	54.0
13	16°00.1	3°46.9	200°51.8	15.2	-10°28.0	10.2	54.0
14	31°00.3	3°46.0	215°26.0	15.2	-10°17.8	10.2	54.0
15	46°00.6	3°45.0	230°00.3	15.3	-10°07.6	10.3	54.0
16	61°00.8	3°44.0	244°34.6	15.3	-9°57.3	10.3	54.0
17	76°01.0	3°43.1	259°08.9	15.3	-9°47.0	10.3	54.0
18	91°01.2	3°42.1	273°43.2	15.4	-9°36.6	10.4	54.0
19	106°01.5	3°41.2	288°17.6	15.4	-9°26.2	10.4	54.0
20	121°01.7	3°40.2	302°52.0	15.4	-9°15.7	10.5	54.0
21	136°01.9	3°39.3	317°26.4	15.4	-9°05.3	10.5	54.0
22	151°02.1	3°38.3	332°00.9	15.5	-8°54.8	10.5	54.0
23	166°02.3	3°37.3	346°35.4	15.5	-8°44.2	10.6	54.0
	SD.=15.9	d=-1.0			S.D.=14.7		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°02.6	3°36.4	1°09.9	15.5	-8°33.6	10.6	54.0
1	196°02.8	3°35.4	15°44.4	15.5	-8°23.0	10.6	54.0
2	211°03.0	3°34.5	30°18.9	15.6	-8°12.4	10.7	54.0
3	226°03.2	3°33.5	44°53.5	15.6	-8°01.7	10.7	54.0
4	241°03.5	3°32.6	59°28.1	15.6	-7°51.0	10.7	54.0
5	256°03.7	3°31.6	74°02.7	15.6	-7°40.2	10.8	54.0
6	271°03.9	3°30.6	88°37.4	15.6	-7°29.4	10.8	54.0
7	286°04.1	3°29.7	103°12.0	15.7	-7°18.6	10.8	54.0
8	301°04.4	3°28.7	117°46.7	15.7	-7°07.8	10.9	54.0
9	316°04.6	3°27.8	132°21.4	15.7	-6°56.9	10.9	54.0
10	331°04.8	3°26.8	146°56.1	15.7	-6°46.0	10.9	54.0
11	346°05.0	3°25.8	161°30.8	15.7	-6°35.1	10.9	54.0
12	1°05.2	3°24.9	176°05.6	15.8	-6°24.1	11.0	54.0
13	16°05.5	3°23.9	190°40.4	15.8	-6°13.1	11.0	54.0
14	31°05.7	3°23.0	205°15.2	15.8	-6°02.1	11.0	54.0
15	46°05.9	3°22.0	219°50.0	15.8	-5°51.1	11.0	54.0
16	61°06.1	3°21.1	234°24.8	15.8	-5°40.1	11.1	54.0
17	76°06.4	3°20.1	248°59.6	15.8	-5°29.0	11.1	54.0
18	91°06.6	3°19.1	263°34.4	15.9	-5°17.9	11.1	54.0
19	106°06.8	3°18.2	278°09.3	15.9	-5°06.8	11.1	54.0
20	121°07.0	3°17.2	292°44.2	15.9	-4°55.6	11.2	54.0
21	136°07.3	3°16.3	307°19.0	15.9	-4°44.4	11.2	54.0
22	151°07.5	3°15.3	321°53.9	15.9	-4°33.3	11.2	54.0
23	166°07.7	3°14.3	336°28.8	15.9	-4°22.0	11.2	54.0
	SD.=15.9	d=-1.0			S.D.=14.7		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	181°07.9	3°13.4	351°03.7	15.9	-4°10.8	11.2	54.0
1	196°08.2	3°12.4	5°38.7	15.9	-3°59.6	11.3	54.1
2	211°08.4	3°11.5	20°13.6	15.9	-3°48.3	11.3	54.1
3	226°08.6	3°10.5	34°48.5	15.9	-3°37.0	11.3	54.1
4	241°08.8	3°09.5	49°23.5	15.9	-3°25.7	11.3	54.1
5	256°09.1	3°08.6	63°58.4	15.9	-3°14.4	11.3	54.1
6	271°09.3	3°07.6	78°33.4	16.0	-3°03.1	11.3	54.1
7	286°09.5	3°06.7	93°08.3	16.0	-2°51.8	11.3	54.1
8	301°09.7	3°05.7	107°43.3	16.0	-2°40.4	11.4	54.1
9	316°09.9	3°04.7	122°18.2	16.0	-2°29.0	11.4	54.1
10	331°10.2	3°03.8	136°53.2	16.0	-2°17.7	11.4	54.1
11	346°10.4	3°02.8	151°28.2	16.0	-2°06.3	11.4	54.1
12	1°10.6	3°01.9	166°03.2	16.0	-1°54.9	11.4	54.1
13	16°10.8	3°00.9	180°38.1	16.0	-1°43.5	11.4	54.1
14	31°11.1	2°59.9	195°13.1	16.0	-1°32.0	11.4	54.1
15	46°11.3	2°59.0	209°48.1	16.0	-1°20.6	11.4	54.1
16	61°11.5	2°58.0	224°23.0	16.0	-1°09.2	11.4	54.2
17	76°11.7	2°57.0	238°58.0	16.0	-0°57.7	11.4	54.2
18	91°12.0	2°56.1	253°32.9	16.0	-0°46.3	11.5	54.2
19	106°12.2	2°55.1	268°07.9	16.0	-0°34.8	11.5	54.2
20	121°12.4	2°54.2	282°42.8	15.9	-0°23.4	11.5	54.2
21	136°12.6	2°53.2	297°17.8	15.9	-0°11.9	11.5	54.2
22	151°12.9	2°52.2	311°52.7	15.9	-0°00.4	11.5	54.2
23	166°13.1	2°51.3	326°27.7	15.9	0°11.1	11.5	54.2
	SD.=15.9	d=-1.0			S.D.=14.7		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	01:56	03:48	05:01	18:47	19:60	21:48
70	02:31	04:02	05:07	18:42	19:46	21:15
68	02:55	04:13	05:12	18:37	19:35	20:52
66	03:13	04:22	05:16	18:34	19:27	20:35
64	03:28	04:30	05:19	18:30	19:19	20:21
62	03:39	04:36	05:22	18:28	19:13	20:09
60	03:49	04:42	05:25	18:25	19:08	19:60
58	03:58	04:47	05:27	18:23	19:03	19:52
56	04:05	04:51	05:29	18:21	18:59	19:44
54	04:11	04:55	05:31	18:20	18:55	19:38
52	04:17	04:58	05:32	18:18	18:52	19:33
50	04:22	05:01	05:34	18:17	18:49	19:28
45	04:32	05:07	05:37	18:14	18:43	19:18
40	04:40	05:12	05:40	18:11	18:38	19:10
35	04:47	05:16	05:42	18:09	18:34	19:04
30	04:52	05:20	05:44	18:07	18:31	18:59
20	04:59	05:25	05:47	18:04	18:26	18:52
10	05:04	05:29	05:50	18:01	18:22	18:47
0	05:08	05:32	05:52	17:59	18:20	18:44
-10	05:09	05:34	05:55	17:57	18:18	18:42
-20	05:10	05:35	05:57	17:54	18:16	18:42
-30	05:08	05:36	06:00	17:52	18:16	18:43
-35	05:07	05:36	06:02	17:50	18:16	18:45
-40	05:05	05:36	06:03	17:49	18:16	18:47
-45	05:02	05:36	06:05	17:47	18:16	18:50
-50	04:58	05:35	06:07	17:45	18:17	18:55
-52	04:56	05:35	06:08	17:44	18:18	18:57
-54	04:53	05:34	06:09	17:43	18:18	18:59
-56	04:50	05:34	06:11	17:42	18:19	19:02
-58	04:47	05:33	06:12	17:41	18:20	19:06
-60	04:44	05:32	06:13	17:39	18:21	19:09

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	19:50	19:32	19:16	02:30	04:22	06:07
70	19:36	19:25	19:15	02:53	04:34	06:12
68	19:25	19:19	19:14	03:10	04:44	06:15
66	19:15	19:15	19:14	03:24	04:52	06:18
64	19:07	19:10	19:13	03:36	04:59	06:21
62	19:00	19:07	19:13	03:45	05:05	06:23
60	18:54	19:04	19:12	03:54	05:10	06:25
58	18:49	19:01	19:12	04:01	05:14	06:27
56	18:44	18:58	19:12	04:07	05:18	06:28
54	18:40	18:56	19:11	04:13	05:21	06:30
52	18:36	18:54	19:11	04:18	05:25	06:31
50	18:33	18:52	19:11	04:23	05:28	06:32
45	18:25	18:48	19:10	04:33	05:34	06:34
40	18:19	18:45	19:10	04:41	05:39	06:36
35	18:13	18:42	19:10	04:48	05:43	06:38
30	18:08	18:39	19:09	04:54	05:47	06:40
20	17:60	18:35	19:09	05:05	05:54	06:42
10	17:52	18:31	19:08	05:14	05:60	06:45
0	17:45	18:27	19:08	05:23	06:05	06:47
-10	17:38	18:23	19:08	05:32	06:11	06:49
-20	17:30	18:19	19:07	05:41	06:16	06:51
-30	17:22	18:14	19:07	05:51	06:23	06:54
-35	17:17	18:12	19:07	05:57	06:27	06:55
-40	17:11	18:09	19:06	06:04	06:31	06:57
-45	17:04	18:05	19:06	06:12	06:36	06:58
-50	16:56	18:01	19:05	06:21	06:42	07:01
-52	16:53	17:59	19:05	06:25	06:44	07:02
-54	16:49	17:57	19:05	06:30	06:47	07:03
-56	16:44	17:54	19:05	06:35	06:50	07:04
-58	16:39	17:52	19:05	06:41	06:54	07:05
-60	16:33	17:49	19:04	06:48	06:58	07:07

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	03:49	04:00	11:56	23:55	11:34	14(99%)
14	04:10	04:21	11:55	00:36	12:16	15(100%)
15	04:32	04:42	11:55	00:36	12:57	16(98%)

September 16, 17 ,18 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	354°39.2	172°31.0	0°28.2	184°58.2	5°34.1	99°25.0	-22°26.4	69°34.0	-22°30.3
1	9°41.7	187°30.7	0°26.9	199°59.2	5°33.5	114°27.2	-22°26.5	84°36.4	-22°30.3
2	24°44.1	202°30.3	0°25.6	215°00.2	5°32.8	129°29.4	-22°26.5	99°38.9	-22°30.3
3	39°46.6	217°29.9	0°24.3	230°01.2	5°32.2	144°31.6	-22°26.5	114°41.4	-22°30.3
4	54°49.1	232°29.6	0°23.1	245°02.2	5°31.6	159°33.8	-22°26.6	129°43.8	-22°30.3
5	69°51.5	247°29.2	0°21.8	260°03.2	5°30.9	174°36.0	-22°26.6	144°46.3	-22°30.4
6	84°54.0	262°28.8	0°20.5	275°04.1	5°30.3	189°38.2	-22°26.6	159°48.8	-22°30.4
7	99°56.4	277°28.5	0°19.2	290°05.1	5°29.6	204°40.4	-22°26.7	174°51.3	-22°30.4
8	114°58.9	292°28.1	0°18.0	305°06.1	5°29.0	219°42.6	-22°26.7	189°53.7	-22°30.4
9	130°01.4	307°27.7	0°16.7	320°07.1	5°28.4	234°44.7	-22°26.7	204°56.2	-22°30.4
10	145°03.8	322°27.4	0°15.4	335°08.1	5°27.7	249°46.9	-22°26.8	219°58.7	-22°30.4
11	160°06.3	337°27.0	0°14.1	350°09.1	5°27.1	264°49.1	-22°26.8	235°01.2	-22°30.4
12	175°08.8	352°26.6	0°12.9	5°10.1	5°26.5	279°51.3	-22°26.8	250°03.6	-22°30.4
13	190°11.2	7°26.3	0°11.6	20°11.1	5°25.8	294°53.5	-22°26.9	265°06.1	-22°30.4
14	205°13.7	22°25.9	0°10.3	35°12.1	5°25.2	309°55.7	-22°26.9	280°08.6	-22°30.4
15	220°16.2	37°25.5	0°09.1	50°13.1	5°24.6	324°57.9	-22°26.9	295°11.0	-22°30.4
16	235°18.6	52°25.2	0°07.8	65°14.0	5°23.9	340°00.0	-22°27.0	310°13.5	-22°30.4
17	250°21.1	67°24.8	0°06.5	80°15.0	5°23.3	355°02.2	-22°27.0	325°16.0	-22°30.4
18	265°23.5	82°24.4	0°05.2	95°16.0	5°22.7	10°04.4	-22°27.0	340°18.5	-22°30.4
19	280°26.0	97°24.1	0°04.0	110°17.0	5°22.0	25°06.6	-22°27.1	355°20.9	-22°30.4
20	295°28.5	112°23.7	0°02.7	125°18.0	5°21.4	40°08.8	-22°27.1	10°23.4	-22°30.4
21	310°30.9	127°23.3	0°01.4	140°19.0	5°20.8	55°11.0	-22°27.1	25°25.9	-22°30.4
22	325°33.4	142°23.0	0°00.1	155°20.0	5°20.1	70°13.1	-22°27.2	40°28.3	-22°30.4
23	340°35.9	157°22.6	-0°01.1	170°21.0	5°19.5	85°15.3	-22°27.2	55°30.8	-22°30.4
Mer.pass.:0:21:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	355°38.3	172°22.2	-0°02.4	185°22.0	5°18.9	100°17.5	-22°27.2	70°33.3	-22°30.4
1	10°40.8	187°21.9	-0°03.7	200°23.0	5°18.2	115°19.7	-22°27.3	85°35.7	-22°30.5
2	25°43.3	202°21.5	-0°05.0	215°24.0	5°17.6	130°21.9	-22°27.3	100°38.2	-22°30.5
3	40°45.7	217°21.1	-0°06.2	230°24.9	5°17.0	145°24.1	-22°27.3	115°40.7	-22°30.5
4	55°48.2	232°20.8	-0°07.5	245°25.9	5°16.3	160°26.2	-22°27.4	130°43.2	-22°30.5
5	70°50.7	247°20.4	-0°08.8	260°26.9	5°15.7	175°28.4	-22°27.4	145°45.6	-22°30.5
6	85°53.1	262°20.0	-0°10.1	275°27.9	5°15.1	190°30.6	-22°27.4	160°48.1	-22°30.5
7	100°55.6	277°19.7	-0°11.3	290°28.9	5°14.4	205°32.8	-22°27.5	175°50.6	-22°30.5
8	115°58.0	292°19.3	-0°12.6	305°29.9	5°13.8	220°35.0	-22°27.5	190°53.0	-22°30.5
9	131°00.5	307°18.9	-0°13.9	320°30.9	5°13.1	235°37.1	-22°27.5	205°55.5	-22°30.5
10	146°03.0	322°18.6	-0°15.2	335°31.9	5°12.5	250°39.3	-22°27.6	220°58.0	-22°30.5
11	161°05.4	337°18.2	-0°16.4	350°32.9	5°11.9	265°41.5	-22°27.6	236°00.4	-22°30.5
12	176°07.9	352°17.8	-0°17.7	5°33.9	5°11.2	280°43.7	-22°27.6	251°02.9	-22°30.5
13	191°10.4	7°17.5	-0°19.0	20°34.9	5°10.6	295°45.9	-22°27.7	266°05.4	-22°30.5
14	206°12.8	22°17.1	-0°20.3	35°35.8	5°10.0	310°48.0	-22°27.7	281°07.8	-22°30.5
15	221°15.3	37°16.7	-0°21.5	50°36.8	5°09.3	325°50.2	-22°27.7	296°10.3	-22°30.5
16	236°17.8	52°16.4	-0°22.8	65°37.8	5°08.7	340°52.4	-22°27.8	311°12.8	-22°30.5
17	251°20.2	67°16.0	-0°24.1	80°38.8	5°08.1	355°54.6	-22°27.8	326°15.2	-22°30.5
18	266°22.7	82°15.6	-0°25.4	95°39.8	5°07.4	10°56.8	-22°27.8	341°17.7	-22°30.5
19	281°25.2	97°15.3	-0°26.6	110°40.8	5°06.8	25°58.9	-22°27.9	356°20.2	-22°30.5
20	296°27.6	112°14.9	-0°27.9	125°41.8	5°06.2	41°01.1	-22°27.9	11°22.6	-22°30.5
21	311°30.1	127°14.5	-0°29.2	140°42.8	5°05.5	56°03.3	-22°27.9	26°25.1	-22°30.5
22	326°32.5	142°14.2	-0°30.5	155°43.8	5°04.9	71°05.5	-22°28.0	41°27.6	-22°30.5
23	341°35.0	157°13.8	-0°31.7	170°44.8	5°04.2	86°07.6	-22°28.0	56°30.0	-22°30.6
Mer.pass.:0:17:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	356°37.5	172°13.4	-0°33.0	185°45.8	5°03.6	101°09.8	-22°28.0	71°32.5	-22°30.6
1	11°39.9	187°13.1	-0°34.3	200°46.7	5°03.0	116°12.0	-22°28.1	86°35.0	-22°30.6
2	26°42.4	202°12.7	-0°35.6	215°47.7	5°02.3	131°14.2	-22°28.1	101°37.4	-22°30.6
3	41°44.9	217°12.3	-0°36.8	230°48.7	5°01.7	146°16.3	-22°28.1	116°39.9	-22°30.6
4	56°47.3	232°12.0	-0°38.1	245°49.7	5°01.1	161°18.5	-22°28.2	131°42.4	-22°30.6
5	71°49.8	247°11.6	-0°39.4	260°50.7	5°00.4	176°20.7	-22°28.2	146°44.8	-22°30.6
6	86°52.3	262°11.2	-0°40.7	275°51.7	4°59.8	191°22.9	-22°28.2	161°47.3	-22°30.6
7	101°54.7	277°10.9	-0°41.9	290°52.7	4°59.2	206°25.0	-22°28.3	176°49.7	-22°30.6
8	116°57.2	292°10.5	-0°43.2	305°53.7	4°58.5	221°27.2	-22°28.3	191°52.2	-22°30.6
9	131°59.6	307°10.1	-0°44.5	320°54.7	4°57.9	236°29.4	-22°28.3	206°54.7	-22°30.6
10	147°02.1	322°09.8	-0°45.8	335°55.7	4°57.2	251°31.6	-22°28.4	221°57.1	-22°30.6
11	162°04.6	337°09.4	-0°47.0	350°56.7	4°56.6	266°33.7	-22°28.4	236°59.6	-22°30.6
12	177°07.0	352°09.0	-0°48.3	5°57.6	4°56.0	281°35.9	-22°28.4	252°02.1	-22°30.6
13	192°09.5	7°08.7	-0°49.6	20°58.6	4°55.3	296°38.1	-22°28.5	267°04.5	-22°30.6
14	207°12.0	22°08.3	-0°50.9	35°59.6	4°54.7	311°40.3	-22°28.5	282°07.0	-22°30.6
15	222°14.4	37°07.9	-0°52.1	51°00.6	4°54.1	326°42.4	-22°28.5	297°09.5	-22°30.6
16	237°16.9	52°07.5	-0°53.4	66°01.6	4°53.4	341°44.6	-22°28.6	312°11.9	-22°30.6
17	252°19.4	67°07.2	-0°54.7	81°02.6	4°52.8	356°46.8	-22°28.6	327°14.4	-22°30.6
18	267°21.8	82°06.8	-0°56.0	96°03.6	4°52.1	11°48.9	-22°28.6	342°16.8	-22°30.6
19	282°24.3	97°06.4	-0°57.2	111°04.6	4°51.5	26°51.1	-22°28.7	357°19.3	-22°30.6
20	297°26.8	112°06.1	-0°58.5	126°05.6	4°50.9	41°53.3	-22°28.7	12°21.8	-22°30.6
21	312°29.2	127°05.7	-0°59.8	141°06.6	4°50.2	56°55.5	-22°28.7	27°24.2	-22°30.6
22	327°31.7	142°05.3	-1°01.1	156°07.6	4°49.6	71°57.6	-22°28.8	42°26.7	-22°30.6
23	342°34.1	157°05.0	-1°02.3	171°08.6	4°49.0	86°59.8	-22°28.8	57°29.1	-22°30.7
Mer.pass.:0:13:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°11.9
Schedar	349°35.1	56°38.6
Diphda	348°51.2	-17°52.7
Achernar	335°23.0	-57°08.1
Hamal	327°55.7	23°33.2
Polaris	315°37.5	89°20.5
Akamar	315°14.8	-40°13.4
Menkar	314°10.4	4°10.0
Mirfak	308°34.0	49°55.6
Aldebaran	290°44.4	16°32.8
Rigel	281°07.9	-8°10.7
Capella	280°28.1	46°00.9
Bellatrix	278°27.4	6°22.0
Elnath	278°07.2	28°37.3
Alnilam	275°42.0	-1°11.3
Betelgeuse	270°56.7	7°24.6
Canopus	263°54.4	-52°42.1
Sirius	258°30.0	-16°44.3
Adara	255°09.3	-28°59.7
Procyon	244°55.3	5°10.7
Pollux	243°22.6	27°58.7
Avior	234°16.7	-59°34.1
Suhail	222°49.7	-43°30.5
Miaplacidus	221°39.6	-69°47.6
Alphard	217°52.2	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.1	61°38.8
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.8
Acrux	173°05.3	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.5	55°51.5
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.3
Hadar	148°42.4	-60°28.0
Menkent	148°02.9	-36°27.9
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.4	-60°54.9
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.8	74°04.9
Alphecca	126°07.6	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.2	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.1	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.1	51°29.6
Kaus Aust.	83°38.0	-34°22.4
Vega	80°36.0	38°48.4
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.1	-56°40.4
Deneb	49°28.3	45°21.3
Enif	33°42.7	9°58.0
Alnair	27°37.9	-46°51.9
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/9/1	**SHA**	**Mer.pass**
Venus	177°51.8	12:30
Mars	190°19.0	11:39
Jupiter	104°45.8	17:20
Saturn	74°54.8	19:19

2019/9/1	**SHA**	**Mer.pass**
Venus	176°43.9	12:31
Mars	189°43.6	11:38
Jupiter	104°39.2	17:16
Saturn	74°54.9	19:15

2019/9/1	**SHA**	**Mer.pass**
Venus	175°35.9	12:31
Mars	189°08.3	11:36
Jupiter	104°32.3	17:13
Saturn	74°55.0	19:11

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°13.3	2°50.3	341°02.6	15.9	0°22.5	11.5	54.2
1	196°13.5	2°49.3	355°37.5	15.9	0°34.0	11.5	54.2
2	211°13.8	2°48.4	10°12.4	15.9	0°45.5	11.5	54.2
3	226°14.0	2°47.4	24°47.3	15.9	0°57.0	11.5	54.2
4	241°14.2	2°46.5	39°22.2	15.9	1°08.5	11.5	54.3
5	256°14.4	2°45.5	53°57.0	15.9	1°19.9	11.5	54.3
6	271°14.7	2°44.5	68°31.9	15.9	1°31.4	11.5	54.3
7	286°14.9	2°43.6	83°06.7	15.8	1°42.9	11.5	54.3
8	301°15.1	2°42.6	97°41.6	15.8	1°54.4	11.5	54.3
9	316°15.3	2°41.6	112°16.4	15.8	2°05.9	11.5	54.3
10	331°15.5	2°40.7	126°51.2	15.8	2°17.3	11.5	54.3
11	346°15.8	2°39.7	141°26.0	15.8	2°28.8	11.5	54.3
12	1°16.0	2°38.8	156°00.8	15.8	2°40.2	11.5	54.3
13	16°16.2	2°37.8	170°35.5	15.7	2°51.7	11.4	54.3
14	31°16.4	2°36.8	185°10.2	15.7	3°03.1	11.4	54.4
15	46°16.7	2°35.9	199°45.0	15.7	3°14.6	11.4	54.4
16	61°16.9	2°34.9	214°19.6	15.7	3°26.0	11.4	54.4
17	76°17.1	2°33.9	228°54.3	15.7	3°37.4	11.4	54.4
18	91°17.3	2°33.0	243°29.0	15.6	3°48.8	11.4	54.4
19	106°17.6	2°32.0	258°03.6	15.6	4°00.2	11.4	54.4
20	121°17.8	2°31.0	272°38.2	15.6	4°11.6	11.4	54.4
21	136°18.0	2°30.1	287°12.8	15.6	4°23.0	11.4	54.4
22	151°18.2	2°29.1	301°47.3	15.5	4°34.4	11.4	54.5
23	166°18.5	2°28.2	316°21.9	15.5	4°45.7	11.3	54.5
	SD.=15.9	d=-1.0			S.D.=14.8		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°18.7	2°27.2	330°56.4	15.5	4°57.1	11.3	54.5
1	196°18.9	2°26.2	345°30.9	15.5	5°08.4	11.3	54.5
2	211°19.1	2°25.3	0°05.3	15.4	5°19.7	11.3	54.5
3	226°19.4	2°24.3	14°39.7	15.4	5°31.0	11.3	54.5
4	241°19.6	2°23.3	29°14.1	15.4	5°42.3	11.3	54.5
5	256°19.8	2°22.4	43°48.5	15.3	5°53.5	11.2	54.5
6	271°20.0	2°21.4	58°22.8	15.3	6°04.7	11.2	54.6
7	286°20.3	2°20.4	72°57.1	15.3	6°16.0	11.2	54.6
8	301°20.5	2°19.5	87°31.4	15.3	6°27.2	11.2	54.6
9	316°20.7	2°18.5	102°05.6	15.2	6°38.3	11.2	54.6
10	331°20.9	2°17.5	116°39.8	15.2	6°49.5	11.1	54.6
11	346°21.2	2°16.6	131°14.0	15.1	7°00.6	11.1	54.6
12	1°21.4	2°15.6	145°48.1	15.1	7°11.8	11.1	54.6
13	16°21.6	2°14.6	160°22.2	15.1	7°22.8	11.1	54.7
14	31°21.8	2°13.7	174°56.3	15.0	7°33.9	11.1	54.7
15	46°22.0	2°12.7	189°30.3	15.0	7°44.9	11.0	54.7
16	61°22.3	2°11.7	204°04.3	15.0	7°56.0	11.0	54.7
17	76°22.5	2°10.8	218°38.2	14.9	8°06.9	11.0	54.7
18	91°22.7	2°09.8	233°12.1	14.9	8°17.9	10.9	54.7
19	106°22.9	2°08.9	247°46.0	14.8	8°28.8	10.9	54.8
20	121°23.2	2°07.9	262°19.8	14.8	8°39.7	10.9	54.8
21	136°23.4	2°06.9	276°53.6	14.8	8°50.6	10.9	54.8
22	151°23.6	2°06.0	291°27.3	14.7	9°01.5	10.8	54.8
23	166°23.8	2°05.0	306°01.0	14.7	9°12.3	10.8	54.8
	SD.=15.9	d=-1.0			S.D.=14.9		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°24.1	2°04.0	320°34.6	14.6	9°23.0	10.8	54.8
1	196°24.3	2°03.1	335°08.2	14.6	9°33.8	10.7	54.9
2	211°24.5	2°02.1	349°41.8	14.5	9°44.5	10.7	54.9
3	226°24.7	2°01.1	4°15.3	14.5	9°55.2	10.7	54.9
4	241°25.0	2°00.2	18°48.7	14.4	10°05.8	10.6	54.9
5	256°25.2	1°59.2	33°22.2	14.4	10°16.4	10.6	54.9
6	271°25.4	1°58.2	47°55.5	14.3	10°27.0	10.6	54.9
7	286°25.6	1°57.3	62°28.8	14.3	10°37.5	10.5	55.0
8	301°25.9	1°56.3	77°02.1	14.2	10°48.0	10.5	55.0
9	316°26.1	1°55.3	91°35.3	14.2	10°58.5	10.4	55.0
10	331°26.3	1°54.4	106°08.5	14.1	11°08.9	10.4	55.0
11	346°26.5	1°53.4	120°41.6	14.1	11°19.3	10.4	55.0
12	1°26.8	1°52.4	135°14.6	14.0	11°29.6	10.3	55.1
13	16°27.0	1°51.5	149°47.6	14.0	11°39.9	10.3	55.1
14	31°27.2	1°50.5	164°20.5	13.9	11°50.2	10.2	55.1
15	46°27.4	1°49.5	178°53.4	13.9	12°00.4	10.2	55.1
16	61°27.6	1°48.5	193°26.3	13.8	12°10.5	10.1	55.1
17	76°27.9	1°47.6	207°59.0	13.7	12°20.6	10.1	55.2
18	91°28.1	1°46.6	222°31.8	13.7	12°30.7	10.0	55.2
19	106°28.3	1°45.6	237°04.4	13.6	12°40.7	10.0	55.2
20	121°28.5	1°44.7	251°37.0	13.6	12°50.7	9.9	55.2
21	136°28.8	1°43.7	266°09.6	13.5	13°00.6	9.9	55.2
22	151°29.0	1°42.7	280°42.0	13.4	13°10.5	9.8	55.3
23	166°29.2	1°41.8	295°14.4	13.4	13°20.3	9.8	55.3
	SD.=15.9	d=-1.0			S.D.=15.0		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:21	04:03	05:15	18:32	19:42	21:22
70	02:49	04:15	05:19	18:28	19:31	20:55
68	03:10	04:25	05:22	18:25	19:22	20:36
66	03:26	04:33	05:25	18:22	19:14	20:20
64	03:38	04:39	05:28	18:20	19:08	20:08
62	03:49	04:45	05:30	18:18	19:03	19:58
60	03:58	04:49	05:32	18:16	18:58	19:49
58	04:05	04:54	05:33	18:15	18:54	19:42
56	04:12	04:57	05:35	18:13	18:51	19:36
54	04:18	05:00	05:36	18:12	18:48	19:30
52	04:23	05:03	05:37	18:11	18:45	19:25
50	04:27	05:06	05:38	18:10	18:42	19:21
45	04:36	05:11	05:41	18:08	18:37	19:12
40	04:43	05:15	05:42	18:06	18:33	19:05
35	04:49	05:19	05:44	18:05	18:30	18:60
30	04:53	05:21	05:45	18:03	18:27	18:55
20	04:60	05:26	05:48	18:01	18:23	18:49
10	05:04	05:29	05:50	17:59	18:20	18:45
0	05:07	05:31	05:51	17:58	18:18	18:42
-10	05:08	05:32	05:53	17:56	18:17	18:42
-20	05:07	05:33	05:55	17:55	18:17	18:42
-30	05:05	05:32	05:56	17:53	18:17	18:45
-35	05:03	05:32	05:57	17:52	18:18	18:47
-40	04:60	05:31	05:58	17:52	18:19	18:50
-45	04:56	05:30	05:59	17:51	18:20	18:54
-50	04:51	05:29	06:01	17:49	18:22	18:59
-52	04:48	05:28	06:01	17:49	18:22	19:02
-54	04:46	05:27	06:02	17:48	18:23	19:05
-56	04:42	05:26	06:03	17:48	18:25	19:08
-58	04:39	05:25	06:03	17:47	18:26	19:12
-60	04:34	05:23	06:04	17:46	18:28	19:17

	Moonrise			**Moonset**		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	18:59	18:41	18:19	07:51	09:37	11:30
70	19:04	18:53	18:41	07:48	09:27	11:10
68	19:09	19:03	18:58	07:46	09:19	10:54
66	19:12	19:12	19:11	07:45	09:12	10:42
64	19:16	19:19	19:23	07:43	09:06	10:32
62	19:18	19:25	19:33	07:42	09:01	10:23
60	19:21	19:30	19:41	07:41	08:57	10:15
58	19:23	19:35	19:49	07:40	08:54	10:09
56	19:25	19:39	19:55	07:39	08:50	10:03
54	19:27	19:43	20:01	07:38	08:47	09:58
52	19:28	19:46	20:06	07:37	08:45	09:53
50	19:30	19:49	20:11	07:37	08:42	09:49
45	19:33	19:56	20:22	07:35	08:37	09:39
40	19:35	20:02	20:31	07:34	08:32	09:32
35	19:38	20:07	20:38	07:33	08:29	09:25
30	19:40	20:11	20:45	07:32	08:25	09:20
20	19:43	20:19	20:56	07:31	08:20	09:10
10	19:47	20:26	21:07	07:29	08:15	09:01
0	19:50	20:32	21:16	07:28	08:10	08:53
-10	19:53	20:38	21:26	07:27	08:05	08:45
-20	19:56	20:45	21:36	07:25	08:00	08:36
-30	19:60	20:53	21:48	07:24	07:54	08:27
-35	20:02	20:58	21:55	07:23	07:51	08:21
-40	20:04	21:03	22:03	07:22	07:47	08:15
-45	20:07	21:09	22:12	07:20	07:43	08:07
-50	20:11	21:17	22:24	07:19	07:38	07:59
-52	20:12	21:20	22:29	07:18	07:36	07:55
-54	20:14	21:24	22:35	07:18	07:33	07:50
-56	20:16	21:28	22:41	07:17	07:30	07:45
-58	20:18	21:32	22:48	07:16	07:27	07:40
-60	20:20	21:38	22:57	07:15	07:24	07:34

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	04:53	05:04	11:54	01:18	13:38	17(95%)
17	05:15	05:25	11:54	01:59	14:20	18(90%)
18	05:36	05:47	11:54	02:42	15:04	19(84%)

September 19, 20 ,21 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	357°36.6	172°04.6	-1°03.6	186°09.5	4°48.3	102°02.0	-22°28.8	72°31.6	-22°30.7
1	12°39.1	187°04.2	-1°04.9	201°10.5	4°47.7	117°04.1	-22°28.9	87°34.1	-22°30.7
2	27°41.5	202°03.9	-1°06.2	216°11.5	4°47.0	132°06.3	-22°28.9	102°36.5	-22°30.7
3	42°44.0	217°03.5	-1°07.4	231°12.5	4°46.4	147°08.5	-22°28.9	117°39.0	-22°30.7
4	57°46.5	232°03.1	-1°08.7	246°13.5	4°45.8	162°10.6	-22°29.0	132°41.5	-22°30.7
5	72°48.9	247°02.8	-1°10.0	261°14.5	4°45.1	177°12.8	-22°29.0	147°43.9	-22°30.7
6	87°51.4	262°02.4	-1°11.3	276°15.5	4°44.5	192°15.0	-22°29.0	162°46.4	-22°30.7
7	102°53.9	277°02.0	-1°12.5	291°16.5	4°43.9	207°17.1	-22°29.1	177°48.8	-22°30.7
8	117°56.3	292°01.7	-1°13.8	306°17.5	4°43.2	222°19.3	-22°29.1	192°51.3	-22°30.7
9	132°58.8	307°01.3	-1°15.1	321°18.5	4°42.6	237°21.5	-22°29.1	207°53.7	-22°30.7
10	148°01.2	322°00.9	-1°16.4	336°19.5	4°41.9	252°23.6	-22°29.2	222°56.2	-22°30.7
11	163°03.7	337°00.6	-1°17.6	351°20.5	4°41.3	267°25.8	-22°29.2	237°58.7	-22°30.7
12	178°06.2	352°00.2	-1°18.9	6°21.4	4°40.7	282°28.0	-22°29.2	253°01.1	-22°30.7
13	193°08.6	6°59.8	-1°20.2	21°22.4	4°40.0	297°30.1	-22°29.3	268°03.6	-22°30.7
14	208°11.1	21°59.5	-1°21.5	36°23.4	4°39.4	312°32.3	-22°29.3	283°06.0	-22°30.7
15	223°13.6	36°59.1	-1°22.7	51°24.4	4°38.8	327°34.5	-22°29.3	298°08.5	-22°30.7
16	238°16.0	51°58.7	-1°24.0	66°25.4	4°38.1	342°36.6	-22°29.4	313°11.0	-22°30.7
17	253°18.5	66°58.4	-1°25.3	81°26.4	4°37.5	357°38.8	-22°29.4	328°13.4	-22°30.7
18	268°21.0	81°58.0	-1°26.6	96°27.4	4°36.8	12°41.0	-22°29.4	343°15.9	-22°30.7
19	283°23.4	96°57.6	-1°27.8	111°28.4	4°36.2	27°43.1	-22°29.5	358°18.3	-22°30.7
20	298°25.9	111°57.3	-1°29.1	126°29.4	4°35.6	42°45.3	-22°29.5	13°20.8	-22°30.7
21	313°28.4	126°56.9	-1°30.4	141°30.4	4°34.9	57°47.5	-22°29.5	28°23.2	-22°30.7
22	328°30.8	141°56.5	-1°31.7	156°31.4	4°34.3	72°49.6	-22°29.6	43°25.7	-22°30.7
23	343°33.3	156°56.2	-1°32.9	171°32.4	4°33.6	87°51.8	-22°29.6	58°28.2	-22°30.7
Mer.pass.:0:09:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.7		v2.2 d-0.0 m-2.0		v2.5 d-0.0 m0.4	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	358°35.7	171°55.8	-1°34.2	186°33.4	4°33.0	102°53.9	-22°29.6	73°30.6	-22°30.7
1	13°38.2	186°55.4	-1°35.5	201°34.3	4°32.4	117°56.1	-22°29.7	88°33.1	-22°30.7
2	28°40.7	201°55.0	-1°36.8	216°35.3	4°31.7	132°58.3	-22°29.7	103°35.5	-22°30.8
3	43°43.1	216°54.7	-1°38.0	231°36.3	4°31.1	148°00.4	-22°29.7	118°38.0	-22°30.8
4	58°45.6	231°54.3	-1°39.3	246°37.3	4°30.4	163°02.6	-22°29.8	133°40.4	-22°30.8
5	73°48.1	246°53.9	-1°40.6	261°38.3	4°29.8	178°04.8	-22°29.8	148°42.9	-22°30.8
6	88°50.5	261°53.6	-1°41.9	276°39.3	4°29.2	193°06.9	-22°29.8	163°45.3	-22°30.8
7	103°53.0	276°53.2	-1°43.1	291°40.3	4°28.5	208°09.1	-22°29.9	178°47.8	-22°30.8
8	118°55.5	291°52.8	-1°44.4	306°41.3	4°27.9	223°11.2	-22°29.9	193°50.3	-22°30.8
9	133°57.9	306°52.5	-1°45.7	321°42.3	4°27.2	238°13.4	-22°29.9	208°52.7	-22°30.8
10	149°00.4	321°52.1	-1°47.0	336°43.3	4°26.6	253°15.6	-22°30.0	223°55.2	-22°30.8
11	164°02.9	336°51.7	-1°48.2	351°44.3	4°26.0	268°17.7	-22°30.0	238°57.6	-22°30.8
12	179°05.3	351°51.4	-1°49.5	6°45.3	4°25.3	283°19.9	-22°30.0	254°00.1	-22°30.8
13	194°07.8	6°51.0	-1°50.8	21°46.3	4°24.7	298°22.0	-22°30.1	269°02.5	-22°30.8
14	209°10.2	21°50.6	-1°52.1	36°47.2	4°24.1	313°24.2	-22°30.1	284°05.0	-22°30.8
15	224°12.7	36°50.2	-1°53.3	51°48.2	4°23.4	328°26.4	-22°30.1	299°07.4	-22°30.8
16	239°15.2	51°49.9	-1°54.6	66°49.2	4°22.8	343°28.5	-22°30.2	314°09.9	-22°30.8
17	254°17.6	66°49.5	-1°55.9	81°50.2	4°22.1	358°30.7	-22°30.2	329°12.3	-22°30.8
18	269°20.1	81°49.1	-1°57.2	96°51.2	4°21.5	13°32.8	-22°30.3	344°14.8	-22°30.8
19	284°22.6	96°48.8	-1°58.4	111°52.2	4°20.9	28°35.0	-22°30.3	359°17.3	-22°30.8
20	299°25.0	111°48.4	-1°59.7	126°53.2	4°20.2	43°37.1	-22°30.3	14°19.7	-22°30.8
21	314°27.5	126°48.0	-2°01.0	141°54.2	4°19.6	58°39.3	-22°30.4	29°22.2	-22°30.8
22	329°30.0	141°47.7	-2°02.3	156°55.2	4°18.9	73°41.5	-22°30.4	44°24.6	-22°30.8
23	344°32.4	156°47.3	-2°03.5	171°56.2	4°18.3	88°43.6	-22°30.4	59°27.1	-22°30.8
Mer.pass.:0:05:		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.2 d-0.0 m-1.9		v2.5 d-0.0 m0.4	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	359°34.9	171°46.9	-2°04.8	186°57.2	4°17.7	103°45.8	-22°30.5	74°29.5	-22°30.8
1	14°37.4	186°46.6	-2°06.1	201°58.2	4°17.0	118°47.9	-22°30.5	89°32.0	-22°30.8
2	29°39.8	201°46.2	-2°07.4	216°59.2	4°16.4	133°50.1	-22°30.5	104°34.4	-22°30.8
3	44°42.3	216°45.8	-2°08.6	232°00.1	4°15.7	148°52.2	-22°30.6	119°36.9	-22°30.8
4	59°44.7	231°45.4	-2°09.9	247°01.1	4°15.1	163°54.4	-22°30.6	134°39.3	-22°30.8
5	74°47.2	246°45.1	-2°11.2	262°02.1	4°14.5	178°56.6	-22°30.6	149°41.8	-22°30.8
6	89°49.7	261°44.7	-2°12.5	277°03.1	4°13.8	193°58.7	-22°30.7	164°44.2	-22°30.8
7	104°52.1	276°44.3	-2°13.7	292°04.1	4°13.2	209°00.9	-22°30.7	179°46.7	-22°30.8
8	119°54.6	291°44.0	-2°15.0	307°05.1	4°12.5	224°03.0	-22°30.7	194°49.1	-22°30.8
9	134°57.1	306°43.6	-2°16.3	322°06.1	4°11.9	239°05.2	-22°30.8	209°51.6	-22°30.8
10	149°59.5	321°43.2	-2°17.5	337°07.1	4°11.2	254°07.3	-22°30.8	224°54.0	-22°30.9
11	165°02.0	336°42.8	-2°18.8	352°08.1	4°10.6	269°09.5	-22°30.8	239°56.5	-22°30.9
12	180°04.5	351°42.5	-2°20.1	7°09.1	4°10.0	284°11.6	-22°30.9	254°58.9	-22°30.9
13	195°06.9	6°42.1	-2°21.4	22°10.1	4°09.3	299°13.8	-22°30.9	270°01.4	-22°30.9
14	210°09.4	21°41.7	-2°22.6	37°11.1	4°08.7	314°15.9	-22°30.9	285°03.8	-22°30.9
15	225°11.8	36°41.4	-2°23.9	52°12.1	4°08.0	329°18.1	-22°31.0	300°06.3	-22°30.9
16	240°14.3	51°41.0	-2°25.2	67°13.1	4°07.4	344°20.2	-22°31.0	315°08.7	-22°30.9
17	255°16.8	66°40.6	-2°26.5	82°14.0	4°06.8	359°22.4	-22°31.0	330°11.2	-22°30.9
18	270°19.2	81°40.3	-2°27.7	97°15.0	4°06.1	14°24.5	-22°31.1	345°13.6	-22°30.9
19	285°21.7	96°39.9	-2°29.0	112°16.0	4°05.5	29°26.7	-22°31.1	0°16.1	-22°30.9
20	300°24.2	111°39.5	-2°30.3	127°17.0	4°04.8	44°28.8	-22°31.1	15°18.5	-22°30.9
21	315°26.6	126°39.1	-2°31.6	142°18.0	4°04.2	59°31.0	-22°31.2	30°21.0	-22°30.9
22	330°29.1	141°38.8	-2°32.8	157°19.0	4°03.6	74°33.1	-22°31.2	45°23.4	-22°30.9
23	345°31.6	156°38.4	-2°34.1	172°20.0	4°02.9	89°35.3	-22°31.3	60°25.9	-22°30.9
Mer.pass.:23:57		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.2 d-0.0 m-1.9		v2.5 d-0.0 m0.4	

Stars	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°11.9
Schedar	349°35.1	56°38.6
Diphda	348°51.2	-17°52.7
Achernar	335°23.0	-57°08.1
Hamal	327°55.7	23°33.3
Polaris	315°36.2	89°20.5
Akamar	315°14.8	-40°13.4
Menkar	314°10.4	4°10.0
Mirfak	308°33.9	49°55.6
Aldebaran	290°44.4	16°32.8
Rigel	281°07.9	-8°10.7
Capella	280°28.1	46°00.9
Bellatrix	278°27.4	6°22.0
Elnath	278°07.2	28°37.3
Alnilam	275°42.0	-1°11.3
Betelgeuse	270°56.7	7°24.6
Canopus	263°54.3	-52°42.1
Sirius	258°29.9	-16°44.3
Adara	255°09.3	-28°59.7
Procyon	244°55.3	5°10.7
Pollux	243°22.6	27°58.6
Avior	234°16.7	-59°34.1
Suhail	222°49.6	-43°30.5
Miaplacidus	221°39.6	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.0	61°38.8
Denebola	182°29.6	14°28.0
Gienah	175°48.2	-17°38.8
Acrux	173°05.3	-63°12.4
Gacrux	171°56.7	-57°13.3
Alioth	166°17.5	55°51.4
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.2
Hadar	148°42.4	-60°28.0
Menkent	148°02.9	-36°27.8
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.4	-60°54.9
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.8	74°04.8
Alphecca	126°07.6	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.2	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.1	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.1	51°29.6
Kaus Aust.	83°38.1	-34°22.4
Vega	80°36.0	38°48.5
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.1	-56°40.4
Deneb	49°28.3	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.7

2019/9/1	SHA	Mer.pass
Venus	174°28.0	12:32
Mars	188°32.9	11:35
Jupiter	104°25.4	17:09
Saturn	74°55.0	19:07

2019/9/2	SHA	Mer.pass
Venus	173°20.0	12:33
Mars	187°57.6	11:33
Jupiter	104°18.2	17:06
Saturn	74°54.9	19:03

2019/9/2	SHA	Mer.pass
Venus	172°12.0	12:33
Mars	187°22.3	11:31
Jupiter	104°10.9	17:03
Saturn	74°54.6	18:59

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	181°29.4	1°40.8	309°46.8	13.3	13°30.1	9.7	55.3
1	196°29.7	1°39.8	324°19.1	13.3	13°39.8	9.7	55.3
2	211°29.9	1°38.9	338°51.3	13.2	13°49.4	9.6	55.4
3	226°30.1	1°37.9	353°23.5	13.1	13°59.0	9.6	55.4
4	241°30.3	1°36.9	7°55.6	13.1	14°08.6	9.5	55.4
5	256°30.6	1°36.0	22°27.6	13.0	14°18.1	9.5	55.4
6	271°30.8	1°35.0	36°59.6	12.9	14°27.5	9.4	55.4
7	286°31.0	1°34.0	51°31.5	12.9	14°36.9	9.3	55.5
8	301°31.2	1°33.1	66°03.4	12.8	14°46.2	9.3	55.5
9	316°31.4	1°32.1	80°35.1	12.7	14°55.5	9.2	55.5
10	331°31.7	1°31.1	95°06.8	12.7	15°04.7	9.2	55.5
11	346°31.9	1°30.2	109°38.5	12.6	15°13.8	9.1	55.6
12	1°32.1	1°29.2	124°10.1	12.5	15°22.9	9.0	55.6
13	16°32.3	1°28.2	138°41.6	12.5	15°31.9	9.0	55.6
14	31°32.6	1°27.2	153°13.0	12.4	15°40.8	8.9	55.6
15	46°32.8	1°26.3	167°44.4	12.3	15°49.7	8.8	55.7
16	61°33.0	1°25.3	182°15.6	12.3	15°58.5	8.8	55.7
17	76°33.2	1°24.3	196°46.9	12.2	16°07.3	8.7	55.7
18	91°33.5	1°23.4	211°18.0	12.1	16°15.9	8.6	55.7
19	106°33.7	1°22.4	225°49.1	12.0	16°24.5	8.6	55.8
20	121°33.9	1°21.4	240°20.1	12.0	16°33.1	8.5	55.8
21	136°34.1	1°20.5	254°51.0	11.9	16°41.5	8.4	55.8
22	151°34.4	1°19.5	269°21.9	11.8	16°49.9	8.4	55.8
23	166°34.6	1°18.5	283°52.7	11.7	16°58.3	8.3	55.9
	SD.=15.9	d=-1.0			S.D.=15.1		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	181°34.8	1°17.6	298°23.4	11.7	17°06.5	8.2	55.9
1	196°35.0	1°16.6	312°54.0	11.6	17°14.7	8.1	55.9
2	211°35.2	1°15.6	327°24.6	11.5	17°22.8	8.1	55.9
3	226°35.5	1°14.6	341°55.0	11.4	17°30.8	8.0	56.0
4	241°35.7	1°13.7	356°25.4	11.4	17°38.7	7.9	56.0
5	256°35.9	1°12.7	10°55.8	11.3	17°46.6	7.8	56.0
6	271°36.1	1°11.7	25°26.0	11.2	17°54.4	7.7	56.0
7	286°36.4	1°10.8	39°56.2	11.1	18°02.1	7.7	56.1
8	301°36.6	1°09.8	54°26.3	11.1	18°09.7	7.6	56.1
9	316°36.8	1°08.8	68°56.3	11.0	18°17.2	7.5	56.1
10	331°37.0	1°07.9	83°26.3	10.9	18°24.6	7.4	56.2
11	346°37.2	1°06.9	97°56.1	10.8	18°32.0	7.3	56.2
12	1°37.5	1°05.9	112°25.9	10.8	18°39.3	7.2	56.2
13	16°37.7	1°04.9	126°55.6	10.7	18°46.5	7.1	56.2
14	31°37.9	1°04.0	141°25.3	10.6	18°53.6	7.1	56.3
15	46°38.1	1°03.0	155°54.8	10.5	19°00.6	7.0	56.3
16	61°38.4	1°02.0	170°24.3	10.4	19°07.5	6.9	56.3
17	76°38.6	1°01.1	184°53.7	10.4	19°14.3	6.8	56.4
18	91°38.8	1°00.1	199°23.0	10.3	19°21.1	6.7	56.4
19	106°39.0	0°59.1	213°52.3	10.2	19°27.7	6.6	56.4
20	121°39.3	0°58.2	228°21.4	10.1	19°34.3	6.5	56.5
21	136°39.5	0°57.2	242°50.5	10.0	19°40.7	6.4	56.5
22	151°39.7	0°56.2	257°19.5	10.0	19°47.1	6.3	56.5
23	166°39.9	0°55.2	271°48.4	9.9	19°53.3	6.2	56.5
	SD.=15.9	d=-1.0			S.D.=15.2		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°40.1	0°54.3	286°17.3	9.8	19°59.5	6.1	56.6
1	196°40.4	0°53.3	300°46.1	9.7	20°05.6	6.0	56.6
2	211°40.6	0°52.3	315°14.7	9.6	20°11.5	5.9	56.6
3	226°40.8	0°51.4	329°43.4	9.6	20°17.4	5.8	56.7
4	241°41.0	0°50.4	344°11.9	9.5	20°23.2	5.7	56.7
5	256°41.3	0°49.4	358°40.3	9.4	20°28.8	5.6	56.7
6	271°41.5	0°48.4	13°08.7	9.3	20°34.4	5.5	56.8
7	286°41.7	0°47.5	27°37.0	9.3	20°39.8	5.4	56.8
8	301°41.9	0°46.5	42°05.2	9.2	20°45.2	5.3	56.8
9	316°42.1	0°45.5	56°33.4	9.1	20°50.4	5.2	56.9
10	331°42.4	0°44.6	71°01.4	9.0	20°55.5	5.1	56.9
11	346°42.6	0°43.6	85°29.4	8.9	21°00.5	5.0	56.9
12	1°42.8	0°42.6	99°57.3	8.9	21°05.4	4.8	57.0
13	16°43.0	0°41.6	114°25.1	8.8	21°10.2	4.7	57.0
14	31°43.2	0°40.7	128°52.9	8.7	21°14.9	4.6	57.0
15	46°43.5	0°39.7	143°20.6	8.6	21°19.5	4.5	57.1
16	61°43.7	0°38.7	157°48.2	8.6	21°23.9	4.4	57.1
17	76°43.9	0°37.8	172°15.7	8.5	21°28.3	4.3	57.1
18	91°44.1	0°36.8	186°43.2	8.4	21°32.5	4.2	57.2
19	106°44.4	0°35.8	201°10.5	8.3	21°36.6	4.0	57.2
20	121°44.6	0°34.8	215°37.8	8.3	21°40.6	3.9	57.2
21	136°44.8	0°33.9	230°05.1	8.2	21°44.4	3.8	57.3
22	151°45.0	0°32.9	244°32.2	8.1	21°48.2	3.7	57.3
23	166°45.2	0°31.9	258°59.3	8.1	21°51.8	3.6	57.3
	SD.=15.9	d=-1.0			S.D.=15.4		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	02:43	04:18	05:28	18:16	19:25	20:59
70	03:06	04:28	05:31	18:14	19:16	20:37
68	03:24	04:36	05:33	18:12	19:08	20:20
66	03:38	04:43	05:35	18:11	19:02	20:07
64	03:49	04:48	05:36	18:09	18:57	19:56
62	03:58	04:53	05:37	18:08	18:52	19:47
60	04:06	04:57	05:39	18:07	18:49	19:39
58	04:13	05:00	05:40	18:06	18:45	19:33
56	04:18	05:03	05:41	18:05	18:42	19:27
54	04:24	05:06	05:41	18:05	18:40	19:22
52	04:28	05:08	05:42	18:04	18:38	19:18
50	04:32	05:10	05:43	18:03	18:36	19:14
45	04:40	05:15	05:44	18:02	18:31	19:06
40	04:46	05:18	05:45	18:01	18:28	18:60
35	04:51	05:21	05:46	18:00	18:26	18:55
30	04:55	05:23	05:47	17:60	18:23	18:51
20	05:01	05:26	05:48	17:58	18:20	18:46
10	05:04	05:28	05:49	17:57	18:18	18:43
0	05:06	05:30	05:50	17:57	18:17	18:41
-10	05:06	05:30	05:51	17:56	18:17	18:41
-20	05:04	05:30	05:52	17:55	18:17	18:43
-30	05:01	05:29	05:53	17:55	18:19	18:47
-35	04:58	05:28	05:53	17:55	18:20	18:49
-40	04:55	05:26	05:53	17:54	18:21	18:53
-45	04:50	05:24	05:54	17:54	18:23	18:58
-50	04:44	05:22	05:54	17:54	18:26	19:04
-52	04:41	05:21	05:54	17:54	18:27	19:07
-54	04:38	05:19	05:55	17:54	18:29	19:10
-56	04:34	05:18	05:55	17:53	18:31	19:14
-58	04:30	05:16	05:55	17:53	18:32	19:19
-60	04:25	05:14	05:55	17:53	18:35	19:24

Lat.	Moonrise			Moonset		
	Thu	Fri	Sat	Thu	Fri	Sat
72	17:43	–:–	–:–	13:42	–:–	–:–
70	18:23	17:49	–:–	13:03	15:19	–:–
68	18:51	18:43	18:28	12:36	14:25	16:30
66	19:13	19:16	19:27	12:16	13:53	15:31
64	19:30	19:41	20:01	11:59	13:29	14:57
62	19:44	20:00	20:26	11:46	13:11	14:33
60	19:56	20:16	20:46	11:35	12:55	14:13
58	20:06	20:30	21:02	11:25	12:42	13:57
56	20:15	20:41	21:16	11:17	12:31	13:43
54	20:23	20:51	21:28	11:09	12:21	13:32
52	20:31	21:01	21:39	11:02	12:12	13:21
50	20:37	21:09	21:49	10:56	12:05	13:12
45	20:51	21:26	22:09	10:43	11:48	12:52
40	21:03	21:41	22:25	10:33	11:34	12:36
35	21:13	21:53	22:39	10:23	11:23	12:23
30	21:22	22:03	22:51	10:15	11:13	12:11
20	21:37	22:22	23:11	10:02	10:56	11:52
10	21:50	22:38	23:29	09:50	10:41	11:34
0	22:03	22:53	23:46	09:38	10:27	11:18
-10	22:16	23:08	–:–	09:27	10:13	11:02
-20	22:29	23:24	–:–	09:15	09:58	10:45
-30	22:45	23:43	–:–	09:02	09:41	10:25
-35	22:54	23:54	–:–	08:54	09:31	10:14
-40	23:05	–:–	00:07	08:45	09:20	10:00
-45	23:17	–:–	00:22	08:35	09:07	09:45
-50	23:32	–:–	00:40	08:22	08:50	09:26
-52	23:39	–:–	00:49	08:16	08:43	09:17
-54	23:47	–:–	00:59	08:10	08:35	09:07
-56	23:56	–:–	01:10	08:03	08:25	08:55
-58	–:–	00:06	01:23	07:55	08:15	08:42
-60	–:–	00:17	01:37	07:46	08:03	08:27

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
19	05:58	06:08	11:53	03:27	15:50	20(76%)
20	06:19	06:30	11:53	04:14	16:39	21(67%)
21	06:40	06:51	11:53	05:05	17:32	22(57%)

September 22, 23 ,24 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	0°34.0	171°38.0	-2°35.4	187°21.0	4°02.3	104°37.4	-22°31.3	75°28.3	-22°30.9
1	15°36.5	186°37.6	-2°36.6	202°22.0	4°01.6	119°39.6	-22°31.3	90°30.8	-22°30.9
2	30°39.0	201°37.3	-2°37.9	217°23.0	4°01.0	134°41.7	-22°31.4	105°33.2	-22°30.9
3	45°41.4	216°36.9	-2°39.2	232°24.0	4°00.4	149°43.9	-22°31.4	120°35.7	-22°30.9
4	60°43.9	231°36.5	-2°40.5	247°25.0	3°59.7	164°46.0	-22°31.4	135°38.1	-22°30.9
5	75°46.3	246°36.2	-2°41.7	262°26.0	3°59.1	179°48.2	-22°31.5	150°40.5	-22°30.9
6	90°48.8	261°35.8	-2°43.0	277°27.0	3°58.4	194°50.3	-22°31.5	165°43.0	-22°30.9
7	105°51.3	276°35.4	-2°44.3	292°27.9	3°57.8	209°52.5	-22°31.5	180°45.4	-22°30.9
8	120°53.7	291°35.0	-2°45.6	307°28.9	3°57.1	224°54.6	-22°31.6	195°47.9	-22°30.9
9	135°56.2	306°34.7	-2°46.8	322°29.9	3°56.5	239°56.8	-22°31.6	210°50.3	-22°30.9
10	150°58.7	321°34.3	-2°48.1	337°30.9	3°55.9	254°58.9	-22°31.6	225°52.8	-22°30.9
11	166°01.1	336°33.9	-2°49.4	352°31.9	3°55.2	270°01.1	-22°31.7	240°55.2	-22°30.9
12	181°03.6	351°33.5	-2°50.6	7°32.9	3°54.6	285°03.2	-22°31.7	255°57.7	-22°30.9
13	196°06.1	6°33.2	-2°51.9	22°33.9	3°53.9	300°05.4	-22°31.7	271°00.1	-22°30.9
14	211°08.5	21°32.8	-2°53.2	37°34.9	3°53.3	315°07.5	-22°31.8	286°02.6	-22°30.9
15	226°11.0	36°32.4	-2°54.5	52°35.9	3°52.6	330°09.7	-22°31.8	301°05.0	-22°30.9
16	241°13.5	51°32.1	-2°55.7	67°36.9	3°52.0	345°11.8	-22°31.8	316°07.4	-22°30.9
17	256°15.9	66°31.7	-2°57.0	82°37.9	3°51.4	0°13.9	-22°31.9	331°09.9	-22°30.9
18	271°18.4	81°31.3	-2°58.3	97°38.9	3°50.7	15°16.1	-22°31.9	346°12.3	-22°30.9
19	286°20.8	96°30.9	-2°59.6	112°39.9	3°50.1	30°18.2	-22°31.9	1°14.8	-22°30.9
20	301°23.3	111°30.6	-3°00.8	127°40.9	3°49.4	45°20.4	-22°32.0	16°17.2	-22°30.9
21	316°25.8	126°30.2	-3°02.1	142°41.8	3°48.8	60°22.5	-22°32.0	31°19.7	-22°30.9
22	331°28.2	141°29.8	-3°03.4	157°42.8	3°48.2	75°24.7	-22°32.1	46°22.1	-22°30.9
23	346°30.7	156°29.4	-3°04.6	172°43.8	3°47.5	90°26.8	-22°32.1	61°24.6	-22°30.9
Mer.pass.:23:53		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d-0.0 m0.4	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	1°33.2	171°29.1	-3°05.9	187°44.8	3°46.9	105°29.0	-22°32.1	76°27.0	-22°30.9
1	16°35.6	186°28.7	-3°07.2	202°45.8	3°46.2	120°31.1	-22°32.2	91°29.4	-22°30.9
2	31°38.1	201°28.3	-3°08.5	217°46.8	3°45.6	135°33.2	-22°32.2	106°31.9	-22°30.9
3	46°40.6	216°27.9	-3°09.7	232°47.8	3°44.9	150°35.4	-22°32.2	121°34.3	-22°31.0
4	61°43.0	231°27.6	-3°11.0	247°48.8	3°44.3	165°37.5	-22°32.3	136°36.8	-22°31.0
5	76°45.5	246°27.2	-3°12.3	262°49.8	3°43.7	180°39.7	-22°32.3	151°39.2	-22°31.0
6	91°48.0	261°26.8	-3°13.5	277°50.8	3°43.0	195°41.8	-22°32.3	166°41.7	-22°31.0
7	106°50.4	276°26.4	-3°14.8	292°51.8	3°42.4	210°43.9	-22°32.4	181°44.1	-22°31.0
8	121°52.9	291°26.1	-3°16.1	307°52.8	3°41.7	225°46.1	-22°32.4	196°46.5	-22°31.0
9	136°55.3	306°25.7	-3°17.3	322°53.8	3°41.1	240°48.2	-22°32.4	211°49.0	-22°31.0
10	151°57.8	321°25.3	-3°18.6	337°54.8	3°40.4	255°50.4	-22°32.5	226°51.4	-22°31.0
11	167°00.3	336°24.9	-3°19.9	352°55.7	3°39.8	270°52.5	-22°32.5	241°53.9	-22°31.0
12	182°02.7	351°24.6	-3°21.2	7°56.7	3°39.2	285°54.6	-22°32.5	256°56.3	-22°31.0
13	197°05.2	6°24.2	-3°22.4	22°57.7	3°38.5	300°56.8	-22°32.6	271°58.7	-22°31.0
14	212°07.7	21°23.8	-3°23.7	37°58.7	3°37.9	315°58.9	-22°32.6	287°01.2	-22°31.0
15	227°10.1	36°23.4	-3°25.0	52°59.7	3°37.2	331°01.1	-22°32.6	302°03.6	-22°31.0
16	242°12.6	51°23.1	-3°26.2	68°00.7	3°36.6	346°03.2	-22°32.7	317°06.1	-22°31.0
17	257°15.1	66°22.7	-3°27.5	83°01.7	3°35.9	1°05.3	-22°32.7	332°08.5	-22°31.0
18	272°17.5	81°22.3	-3°28.8	98°02.7	3°35.3	16°07.5	-22°32.8	347°10.9	-22°31.0
19	287°20.0	96°21.9	-3°30.0	113°03.7	3°34.7	31°09.6	-22°32.8	2°13.4	-22°31.0
20	302°22.4	111°21.6	-3°31.3	128°04.7	3°34.0	46°11.8	-22°32.8	17°15.8	-22°31.0
21	317°24.9	126°21.2	-3°32.6	143°05.7	3°33.4	61°13.9	-22°32.9	32°18.3	-22°31.0
22	332°27.4	141°20.8	-3°33.9	158°06.7	3°32.7	76°16.0	-22°32.9	47°20.7	-22°31.0
23	347°29.8	156°20.4	-3°35.1	173°07.7	3°32.1	91°18.2	-22°32.9	62°23.1	-22°31.0
Mer.pass.:23:49		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d-0.0 m0.4	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	2°32.3	171°20.0	-3°36.4	188°08.7	3°31.4	106°20.3	-22°33.0	77°25.6	-22°31.0
1	17°34.8	186°19.7	-3°37.7	203°09.7	3°30.8	121°22.4	-22°33.0	92°28.0	-22°31.0
2	32°37.2	201°19.3	-3°38.9	218°10.6	3°30.2	136°24.6	-22°33.0	107°30.5	-22°31.0
3	47°39.7	216°18.9	-3°40.2	233°11.6	3°29.5	151°26.7	-22°33.1	122°32.9	-22°31.0
4	62°42.2	231°18.5	-3°41.5	248°12.6	3°28.9	166°28.9	-22°33.1	137°35.3	-22°31.0
5	77°44.6	246°18.2	-3°42.7	263°13.6	3°28.2	181°31.0	-22°33.1	152°37.8	-22°31.0
6	92°47.1	261°17.8	-3°44.0	278°14.6	3°27.6	196°33.1	-22°33.2	167°40.2	-22°31.0
7	107°49.6	276°17.4	-3°45.3	293°15.6	3°26.9	211°35.3	-22°33.2	182°42.6	-22°31.0
8	122°52.0	291°17.0	-3°46.5	308°16.6	3°26.3	226°37.4	-22°33.2	197°45.1	-22°31.0
9	137°54.5	306°16.6	-3°47.8	323°17.6	3°25.6	241°39.5	-22°33.3	212°47.5	-22°31.0
10	152°56.9	321°16.3	-3°49.1	338°18.6	3°25.0	256°41.7	-22°33.3	227°50.0	-22°31.0
11	167°59.4	336°15.9	-3°50.3	353°19.6	3°24.4	271°43.8	-22°33.4	242°52.4	-22°31.0
12	183°01.9	351°15.5	-3°51.6	8°20.6	3°23.7	286°45.9	-22°33.4	257°54.8	-22°31.0
13	198°04.3	6°15.1	-3°52.9	23°21.6	3°23.1	301°48.1	-22°33.4	272°57.3	-22°31.0
14	213°06.8	21°14.8	-3°54.2	38°22.6	3°22.4	316°50.2	-22°33.5	287°59.7	-22°31.0
15	228°09.3	36°14.4	-3°55.4	53°23.6	3°21.8	331°52.3	-22°33.5	303°02.1	-22°31.0
16	243°11.7	51°14.0	-3°56.7	68°24.6	3°21.1	346°54.5	-22°33.5	318°04.6	-22°31.0
17	258°14.2	66°13.6	-3°58.0	83°25.5	3°20.5	1°56.6	-22°33.6	333°07.0	-22°31.0
18	273°16.7	81°13.2	-3°59.2	98°26.5	3°19.9	16°58.7	-22°33.6	348°09.4	-22°31.0
19	288°19.1	96°12.9	-4°00.5	113°27.5	3°19.2	32°00.9	-22°33.6	3°11.9	-22°31.0
20	303°21.6	111°12.5	-4°01.8	128°28.5	3°18.6	47°03.0	-22°33.7	18°14.3	-22°31.0
21	318°24.1	126°12.1	-4°03.0	143°29.5	3°17.9	62°05.1	-22°33.7	33°16.8	-22°31.0
22	333°26.5	141°11.7	-4°04.3	158°30.5	3°17.3	77°07.2	-22°33.7	48°19.2	-22°31.0
23	348°29.0	156°11.3	-4°05.6	173°31.5	3°16.6	92°09.4	-22°33.8	63°21.6	-22°31.0
Mer.pass.:23:45		v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d-0.0 m0.4	

Stars

	SHA	**Dec**
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°11.9
Schedar	349°35.1	56°38.6
Diphda	348°51.1	-17°52.7
Achernar	335°23.0	-57°08.2
Hamal	327°55.7	23°33.3
Polaris	315°34.9	89°20.5
Akamar	315°14.8	-40°13.4
Menkar	314°10.3	4°10.0
Mirfak	308°33.9	49°55.6
Aldebaran	290°44.3	16°32.9
Rigel	281°07.9	-8°10.7
Capella	280°28.0	46°00.9
Bellatrix	278°27.4	6°22.0
Elnath	278°07.2	28°37.3
Alnilam	275°42.0	-1°11.3
Betelgeuse	270°56.7	7°24.6
Canopus	263°54.3	-52°42.1
Sirius	258°29.9	-16°44.3
Adara	255°09.2	-28°59.7
Procyon	244°55.3	5°10.7
Pollux	243°22.6	27°58.6
Avior	234°16.7	-59°34.1
Suhail	222°49.6	-43°30.5
Miaplacidus	221°39.6	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.0	61°38.8
Denebola	182°29.5	14°28.0
Gienah	175°48.2	-17°38.8
Acrux	173°05.3	-63°12.3
Gacrux	171°56.7	-57°13.2
Alioth	166°17.5	55°51.4
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.2
Hadar	148°42.4	-60°28.0
Menkent	148°02.9	-36°27.8
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.4	-60°54.9
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.9	74°04.8
Alphecca	126°07.6	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.2	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.1	-34°22.4
Vega	80°36.0	38°48.5
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.1	-56°40.4
Deneb	49°28.3	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.0
Scheat	13°48.9	28°11.4
Markab	13°33.8	15°18.8

2019/9/2	**SHA**	**Mer.pass**
Venus	171°04.0	12:34
Mars	186°47.0	11:30
Jupiter	104°03.4	16:59
Saturn	74°54.3	18:55

2019/9/2	**SHA**	**Mer.pass**
Venus	169°55.9	12:34
Mars	186°11.7	11:28
Jupiter	103°55.8	16:56
Saturn	74°53.8	18:51

2019/9/2	**SHA**	**Mer.pass**
Venus	168°47.7	12:35
Mars	185°36.4	11:27
Jupiter	103°48.0	16:52
Saturn	74°53.3	18:47

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°45.5	0°31.0	273°26.3	8.0	21°55.3	3.4	57.4
1	196°45.7	0°30.0	287°53.3	7.9	21°58.7	3.3	57.4
2	211°45.9	0°29.0	302°20.2	7.8	22°02.0	3.2	57.4
3	226°46.1	0°28.0	316°47.0	7.8	22°05.1	3.1	57.5
4	241°46.3	0°27.1	331°13.7	7.7	22°08.1	2.9	57.5
5	256°46.6	0°26.1	345°40.4	7.6	22°11.0	2.8	57.5
6	271°46.8	0°25.1	0°07.0	7.6	22°13.7	2.7	57.6
7	286°47.0	0°24.2	14°33.5	7.5	22°16.4	2.6	57.6
8	301°47.2	0°23.2	28°60.0	7.4	22°18.9	2.4	57.6
9	316°47.5	0°22.2	43°26.4	7.4	22°21.2	2.3	57.7
10	331°47.7	0°21.2	57°52.7	7.3	22°23.5	2.2	57.7
11	346°47.9	0°20.3	72°19.0	7.2	22°25.6	2.0	57.7
12	1°48.1	0°19.3	86°45.2	7.2	22°27.6	1.9	57.8
13	16°48.3	0°18.3	101°11.3	7.1	22°29.4	1.8	57.8
14	31°48.6	0°17.3	115°37.4	7.1	22°31.1	1.6	57.8
15	46°48.8	0°16.4	130°03.4	7.0	22°32.7	1.5	57.9
16	61°49.0	0°15.4	144°29.4	6.9	22°34.1	1.4	57.9
17	76°49.2	0°14.4	158°55.3	6.9	22°35.4	1.2	58.0
18	91°49.4	0°13.5	173°21.2	6.8	22°36.6	1.1	58.0
19	106°49.7	0°12.5	187°47.0	6.8	22°37.6	1.0	58.0
20	121°49.9	0°11.5	202°12.7	6.7	22°38.5	0.8	58.1
21	136°50.1	0°10.5	216°38.4	6.7	22°39.3	0.7	58.1
22	151°50.3	0°09.6	231°04.0	6.6	22°39.9	0.5	58.1
23	166°50.5	0°08.6	245°29.6	6.6	22°40.4	0.4	58.2
	SD.=15.9	d=-1.0			S.D.=15.6		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°50.8	0°07.6	259°55.2	6.5	22°40.7	0.3	58.2
1	196°51.0	0°06.6	274°20.6	6.5	22°40.9	0.1	58.2
2	211°51.2	0°05.7	288°46.1	6.4	22°40.9	-0.0	58.3
3	226°51.4	0°04.7	303°11.5	6.4	22°40.8	-0.2	58.3
4	241°51.6	0°03.7	317°36.8	6.3	22°40.6	-0.3	58.4
5	256°51.9	0°02.8	332°02.1	6.3	22°40.2	-0.4	58.4
6	271°52.1	0°01.8	346°27.3	6.2	22°39.7	-0.6	58.4
7	286°52.3	0°00.8	0°52.6	6.2	22°39.0	-0.7	58.5
8	301°52.5	-0°00.2	15°17.7	6.1	22°38.2	-0.9	58.5
9	316°52.7	-0°01.1	29°42.9	6.1	22°37.3	-1.0	58.5
10	331°53.0	-0°02.1	44°07.9	6.1	22°36.2	-1.2	58.6
11	346°53.2	-0°03.1	58°33.0	6.0	22°34.9	-1.3	58.6
12	1°53.4	-0°04.1	72°58.0	6.0	22°33.5	-1.5	58.6
13	16°53.6	-0°05.0	87°23.0	6.0	22°32.0	-1.6	58.7
14	31°53.8	-0°06.0	101°47.9	5.9	22°30.3	-1.8	58.7
15	46°54.0	-0°07.0	116°12.9	5.9	22°28.5	-1.9	58.8
16	61°54.3	-0°07.9	130°37.7	5.9	22°26.5	-2.1	58.8
17	76°54.5	-0°08.9	145°02.6	5.8	22°24.4	-2.2	58.8
18	91°54.7	-0°09.9	159°27.4	5.8	22°22.1	-2.4	58.9
19	106°54.9	-0°10.9	173°52.2	5.8	22°19.7	-2.5	58.9
20	121°55.1	-0°11.8	188°17.0	5.8	22°17.1	-2.6	58.9
21	136°55.4	-0°12.8	202°41.7	5.7	22°14.4	-2.8	59.0
22	151°55.6	-0°13.8	217°06.5	5.7	22°11.5	-2.9	59.0
23	166°55.8	-0°14.8	231°31.2	5.7	22°08.5	-3.1	59.0
	SD.=15.9	d=-1.0			S.D.=15.9		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	181°56.0	-0°15.7	245°55.8	5.7	22°05.3	-3.2	59.1
1	196°56.2	-0°16.7	260°20.5	5.7	22°02.0	-3.4	59.1
2	211°56.5	-0°17.7	274°45.2	5.6	21°58.5	-3.5	59.2
3	226°56.7	-0°18.7	289°09.8	5.6	21°54.9	-3.7	59.2
4	241°56.9	-0°19.6	303°34.4	5.6	21°51.1	-3.8	59.2
5	256°57.1	-0°20.6	317°59.0	5.6	21°47.2	-4.0	59.3
6	271°57.3	-0°21.6	332°23.6	5.6	21°43.1	-4.1	59.3
7	286°57.5	-0°22.5	346°48.2	5.6	21°38.9	-4.3	59.3
8	301°57.8	-0°23.5	1°12.7	5.6	21°34.6	-4.4	59.4
9	316°58.0	-0°24.5	15°37.3	5.6	21°30.0	-4.6	59.4
10	331°58.2	-0°25.5	30°01.8	5.5	21°25.4	-4.7	59.4
11	346°58.4	-0°26.4	44°26.4	5.5	21°20.6	-4.9	59.5
12	1°58.6	-0°27.4	58°50.9	5.5	21°15.6	-5.0	59.5
13	16°58.8	-0°28.4	73°15.5	5.5	21°10.5	-5.2	59.5
14	31°59.1	-0°29.4	87°40.0	5.5	21°05.3	-5.3	59.6
15	46°59.3	-0°30.3	102°04.5	5.5	20°59.9	-5.5	59.6
16	61°59.5	-0°31.3	116°29.1	5.5	20°54.3	-5.6	59.6
17	76°59.7	-0°32.3	130°53.6	5.5	20°48.6	-5.8	59.7
18	91°59.9	-0°33.3	145°18.1	5.5	20°42.8	-5.9	59.7
19	107°00.2	-0°34.2	159°42.7	5.5	20°36.8	-6.1	59.7
20	122°00.4	-0°35.2	174°07.2	5.6	20°30.7	-6.2	59.8
21	137°00.6	-0°36.2	188°31.8	5.6	20°24.4	-6.3	59.8
22	152°00.8	-0°37.2	202°56.4	5.6	20°18.0	-6.5	59.8
23	167°01.0	-0°38.1	217°20.9	5.6	20°11.4	-6.6	59.9
	SD.=15.9	d=-1.0			S.D.=16.1		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:02	04:33	05:41	18:01	19:09	20:38
70	03:22	04:41	05:42	18:00	19:01	20:19
68	03:37	04:47	05:43	17:60	18:55	20:05
66	03:49	04:53	05:44	17:59	18:50	19:53
64	03:59	04:57	05:45	17:59	18:46	19:44
62	04:07	05:01	05:45	17:58	18:42	19:36
60	04:14	05:04	05:46	17:58	18:39	19:29
58	04:20	05:07	05:46	17:58	18:37	19:23
56	04:25	05:09	05:46	17:57	18:34	19:18
54	04:29	05:11	05:47	17:57	18:32	19:14
52	04:33	05:13	05:47	17:57	18:31	19:10
50	04:37	05:15	05:47	17:57	18:29	19:07
45	04:44	05:18	05:48	17:56	18:26	18:60
40	04:49	05:21	05:48	17:56	18:23	18:55
35	04:54	05:23	05:48	17:56	18:21	18:51
30	04:57	05:25	05:49	17:56	18:20	18:47
20	05:01	05:27	05:49	17:56	18:18	18:43
10	05:04	05:28	05:49	17:56	18:17	18:41
0	05:05	05:29	05:49	17:56	18:16	18:40
-10	05:04	05:28	05:49	17:56	18:17	18:41
-20	05:01	05:27	05:49	17:56	18:18	18:44
-30	04:57	05:25	05:49	17:57	18:20	18:48
-35	04:54	05:23	05:49	17:57	18:22	18:52
-40	04:50	05:21	05:48	17:57	18:24	18:56
-45	04:44	05:19	05:48	17:58	18:27	19:01
-50	04:37	05:15	05:48	17:58	18:31	19:09
-52	04:34	05:14	05:47	17:59	18:32	19:12
-54	04:30	05:12	05:47	17:59	18:34	19:16
-56	04:26	05:10	05:47	17:59	18:36	19:21
-58	04:21	05:07	05:46	17:60	18:39	19:26
-60	04:15	05:05	05:46	18:00	18:42	19:32

		Moonrise			**Moonset**	
Lat.	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	22:08	–:–	–:–	18:51
66	19:57	21:07	22:50	16:57	17:48	18:08
64	20:40	21:46	23:18	16:14	17:08	17:39
62	21:09	22:14	23:40	15:45	16:41	17:17
60	21:31	22:35	23:57	15:23	16:19	16:59
58	21:49	22:53	–:–	15:05	16:01	16:44
56	22:04	23:07	–:–	14:50	15:47	16:31
54	22:17	23:20	–:–	14:37	15:34	16:20
52	22:29	23:31	–:–	14:26	15:23	16:10
50	22:39	23:41	–:–	14:16	15:13	16:01
45	23:00	–:–	00:02	13:54	14:52	15:42
40	23:17	–:–	00:18	13:37	14:35	15:27
35	23:32	–:–	00:32	13:23	14:20	15:14
30	23:45	–:–	00:45	13:10	14:08	15:02
20	–:–	00:06	01:06	12:49	13:46	14:42
10	–:–	00:25	01:24	12:30	13:28	14:25
0	–:–	00:43	01:41	12:13	13:10	14:09
-10	00:03	01:00	01:58	11:56	12:53	13:53
-20	00:21	01:19	02:16	11:37	12:34	13:35
-30	00:42	01:41	02:37	11:15	12:12	13:15
-35	00:55	01:54	02:49	11:03	11:60	13:03
-40	01:09	02:08	03:03	10:48	11:45	12:50
-45	01:26	02:26	03:20	10:31	11:28	12:34
-50	01:46	02:47	03:40	10:10	11:06	12:14
-52	01:56	02:58	03:50	10:00	10:56	12:04
-54	02:08	03:09	04:01	09:49	10:44	11:53
-56	02:20	03:23	04:13	09:36	10:31	11:41
-58	02:35	03:38	04:28	09:21	10:15	11:27
-60	02:53	03:57	04:45	09:03	09:57	11:11

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	07:02	07:12	11:52	05:59	18:27	23(46%)
23	07:23	07:33	11:52	06:56	19:25	24(35%)
24	07:44	07:54	11:52	07:54	20:24	25(25%)

September 25, 26 ,27 (Wed., Thu., Fri.)

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	3°31.4	171°11.0	-4°06.8	188°32.5	3°16.0	107°11.5	-22°33.8	78°24.1	-22°31.0
1	18°33.9	186°10.6	-4°08.1	203°33.5	3°15.3	122°13.6	-22°33.8	93°26.5	-22°31.0
2	33°36.4	201°10.2	-4°09.4	218°34.5	3°14.7	137°15.8	-22°33.9	108°28.9	-22°31.0
3	48°38.8	216°09.8	-4°10.6	233°35.5	3°14.1	152°17.9	-22°33.9	123°31.4	-22°31.0
4	63°41.3	231°09.4	-4°11.9	248°36.5	3°13.4	167°20.0	-22°34.0	138°33.8	-22°31.0
5	78°43.8	246°09.0	-4°13.2	263°37.5	3°12.8	182°22.2	-22°34.0	153°36.2	-22°31.0
6	93°46.2	261°08.7	-4°14.4	278°38.5	3°12.1	197°24.3	-22°34.0	168°38.7	-22°31.0
7	108°48.7	276°08.3	-4°15.7	293°39.5	3°11.5	212°26.4	-22°34.1	183°41.1	-22°31.0
8	123°51.2	291°07.9	-4°16.9	308°40.4	3°10.8	227°28.5	-22°34.1	198°43.5	-22°31.0
9	138°53.6	306°07.5	-4°18.2	323°41.4	3°10.2	242°30.7	-22°34.1	213°46.0	-22°31.0
10	153°56.1	321°07.1	-4°19.5	338°42.4	3°09.5	257°32.8	-22°34.2	228°48.4	-22°31.0
11	168°58.5	336°06.8	-4°20.7	353°43.4	3°08.9	272°34.9	-22°34.2	243°50.8	-22°31.0
12	184°01.0	351°06.4	-4°22.0	8°44.4	3°08.3	287°37.1	-22°34.2	258°53.3	-22°31.0
13	199°03.5	6°06.0	-4°23.3	23°45.4	3°07.6	302°39.2	-22°34.3	273°55.7	-22°31.0
14	214°05.9	21°05.6	-4°24.5	38°46.4	3°07.0	317°41.3	-22°34.3	288°58.1	-22°31.0
15	229°08.4	36°05.2	-4°25.8	53°47.4	3°06.3	332°43.4	-22°34.3	304°00.5	-22°31.0
16	244°10.9	51°04.8	-4°27.1	68°48.4	3°05.7	347°45.6	-22°34.4	319°03.0	-22°31.0
17	259°13.3	66°04.5	-4°28.3	83°49.4	3°05.0	2°47.7	-22°34.4	334°05.4	-22°31.0
18	274°15.8	81°04.1	-4°29.6	98°50.4	3°04.4	17°49.8	-22°34.5	349°07.8	-22°31.1
19	289°18.3	96°03.7	-4°30.9	113°51.4	3°03.7	32°51.9	-22°34.5	4°10.3	-22°31.1
20	304°20.7	111°03.3	-4°32.1	128°52.4	3°03.1	47°54.1	-22°34.5	19°12.7	-22°31.1
21	319°23.2	126°02.9	-4°33.4	143°53.4	3°02.4	62°56.2	-22°34.6	34°15.1	-22°31.1
22	334°25.7	141°02.5	-4°34.6	158°54.4	3°01.8	77°58.3	-22°34.6	49°17.6	-22°31.1
23	349°28.1	156°02.2	-4°35.9	173°55.3	3°01.2	93°00.4	-22°34.6	64°20.0	-22°31.1
	Mer.pass.:23:42	v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d-0.0 m0.5	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	4°30.6	171°01.8	-4°37.2	188°56.3	3°00.5	108°02.6	-22°34.7	79°22.4	-22°31.1
1	19°33.0	186°01.4	-4°38.4	203°57.3	2°59.9	123°04.7	-22°34.7	94°24.9	-22°31.1
2	34°35.5	201°01.0	-4°39.7	218°58.3	2°59.2	138°06.8	-22°34.7	109°27.3	-22°31.1
3	49°38.0	216°00.6	-4°41.0	233°59.3	2°58.6	153°08.9	-22°34.8	124°29.7	-22°31.1
4	64°40.4	231°00.2	-4°42.2	249°00.3	2°57.9	168°11.1	-22°34.8	139°32.1	-22°31.1
5	79°42.9	245°59.9	-4°43.5	264°01.3	2°57.3	183°13.2	-22°34.8	154°34.6	-22°31.1
6	94°45.4	260°59.5	-4°44.7	279°02.3	2°56.6	198°15.3	-22°34.9	169°37.0	-22°31.1
7	109°47.8	275°59.1	-4°46.0	294°03.3	2°56.0	213°17.4	-22°34.9	184°39.4	-22°31.1
8	124°50.3	290°58.7	-4°47.3	309°04.3	2°55.3	228°19.5	-22°35.0	199°41.9	-22°31.1
9	139°52.8	305°58.3	-4°48.5	324°05.3	2°54.7	243°21.7	-22°35.0	214°44.3	-22°31.1
10	154°55.2	320°57.9	-4°49.8	339°06.3	2°54.1	258°23.8	-22°35.0	229°46.7	-22°31.1
11	169°57.7	335°57.5	-4°51.1	354°07.3	2°53.4	273°25.9	-22°35.1	244°49.1	-22°31.1
12	185°00.2	350°57.2	-4°52.3	9°08.3	2°52.8	288°28.0	-22°35.1	259°51.6	-22°31.1
13	200°02.6	5°56.8	-4°53.6	24°09.3	2°52.1	303°30.1	-22°35.1	274°54.0	-22°31.1
14	215°05.1	20°56.4	-4°54.8	39°10.2	2°51.5	318°32.3	-22°35.2	289°56.4	-22°31.1
15	230°07.5	35°56.0	-4°56.1	54°11.2	2°50.8	333°34.4	-22°35.2	304°58.9	-22°31.1
16	245°10.0	50°55.6	-4°57.4	69°12.2	2°50.2	348°36.5	-22°35.2	320°01.3	-22°31.1
17	260°12.5	65°55.2	-4°58.6	84°13.2	2°49.5	3°38.6	-22°35.3	335°03.7	-22°31.1
18	275°14.9	80°54.8	-4°59.9	99°14.2	2°48.9	18°40.7	-22°35.3	350°06.1	-22°31.1
19	290°17.4	95°54.4	-5°01.1	114°15.2	2°48.2	33°42.9	-22°35.3	5°08.6	-22°31.1
20	305°19.9	110°54.1	-5°02.4	129°16.2	2°47.6	48°45.0	-22°35.4	20°11.0	-22°31.1
21	320°22.3	125°53.7	-5°03.7	144°17.2	2°47.0	63°47.1	-22°35.4	35°13.4	-22°31.1
22	335°24.8	140°53.3	-5°04.9	159°18.2	2°46.3	78°49.2	-22°35.5	50°15.8	-22°31.1
23	350°27.3	155°52.9	-5°06.2	174°19.2	2°45.7	93°51.3	-22°35.5	65°18.3	-22°31.1
	Mer.pass.:23:38	v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d-0.0 m0.5	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	5°29.7	170°52.5	-5°07.4	189°20.2	2°45.0	108°53.5	-22°35.5	80°20.7	-22°31.1
1	20°32.2	185°52.1	-5°08.7	204°21.2	2°44.4	123°55.6	-22°35.6	95°23.1	-22°31.1
2	35°34.6	200°51.7	-5°10.0	219°22.2	2°43.7	138°57.7	-22°35.6	110°25.5	-22°31.1
3	50°37.1	215°51.3	-5°11.2	234°23.2	2°43.1	153°59.8	-22°35.6	125°28.0	-22°31.1
4	65°39.6	230°50.9	-5°12.5	249°24.2	2°42.4	169°01.9	-22°35.7	140°30.4	-22°31.1
5	80°42.0	245°50.6	-5°13.7	264°25.1	2°41.8	184°04.0	-22°35.7	155°32.8	-22°31.1
6	95°44.5	260°50.2	-5°15.0	279°26.1	2°41.1	199°06.2	-22°35.7	170°35.2	-22°31.1
7	110°47.0	275°49.8	-5°16.3	294°27.1	2°40.5	214°08.3	-22°35.8	185°37.7	-22°31.1
8	125°49.4	290°49.4	-5°17.5	309°28.1	2°39.8	229°10.4	-22°35.8	200°40.1	-22°31.1
9	140°51.9	305°49.0	-5°18.8	324°29.1	2°39.2	244°12.5	-22°35.8	215°42.5	-22°31.1
10	155°54.4	320°48.6	-5°20.0	339°30.1	2°38.6	259°14.6	-22°35.9	230°44.9	-22°31.1
11	170°56.8	335°48.2	-5°21.3	354°31.1	2°37.9	274°16.7	-22°35.9	245°47.4	-22°31.1
12	185°59.3	350°47.8	-5°22.5	9°32.1	2°37.3	289°18.8	-22°36.0	260°49.8	-22°31.1
13	201°01.8	5°47.4	-5°23.8	24°33.1	2°36.6	304°21.0	-22°36.0	275°52.2	-22°31.1
14	216°04.2	20°47.0	-5°25.1	39°34.1	2°36.0	319°23.1	-22°36.0	290°54.6	-22°31.1
15	231°06.7	35°46.7	-5°26.3	54°35.1	2°35.3	334°25.2	-22°36.1	305°57.0	-22°31.1
16	246°09.1	50°46.3	-5°27.6	69°36.1	2°34.7	349°27.3	-22°36.1	320°59.5	-22°31.1
17	261°11.6	65°45.9	-5°28.8	84°37.1	2°34.0	4°29.4	-22°36.1	336°01.9	-22°31.1
18	276°14.1	80°45.5	-5°30.1	99°38.1	2°33.4	19°31.5	-22°36.2	351°04.3	-22°31.1
19	291°16.5	95°45.1	-5°31.3	114°39.1	2°32.7	34°33.6	-22°36.2	6°06.7	-22°31.1
20	306°19.0	110°44.7	-5°32.6	129°40.1	2°32.1	49°35.8	-22°36.2	21°09.2	-22°31.1
21	321°21.5	125°44.3	-5°33.8	144°41.0	2°31.4	64°37.9	-22°36.3	36°11.6	-22°31.1
22	336°23.9	140°43.9	-5°35.1	159°42.0	2°30.8	79°40.0	-22°36.3	51°14.0	-22°31.1
23	351°26.4	155°43.5	-5°36.4	174°43.0	2°30.1	94°42.1	-22°36.4	66°16.4	-22°31.1
	Mer.pass.:23:34	v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d-0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°11.9
Schedar	349°35.1	56°38.7
Diphda	348°51.1	-17°52.7
Achernar	335°23.0	-57°08.2
Hamal	327°55.6	23°33.3
Polaris	315°33.8	89°20.5
Akamar	315°14.7	-40°13.5
Menkar	314°10.3	4°10.0
Mirfak	308°33.9	49°55.6
Aldebaran	290°44.3	16°32.9
Rigel	281°07.8	-8°10.7
Capella	280°28.0	46°00.9
Bellatrix	278°27.3	6°22.0
Elnath	278°07.1	28°37.3
Alnilam	275°42.0	-1°11.3
Betelgeuse	270°56.6	7°24.6
Canopus	263°54.3	-52°42.1
Sirius	258°29.9	-16°44.3
Adara	255°09.2	-28°59.7
Procyon	244°55.3	5°10.7
Pollux	243°22.5	27°58.6
Avior	234°16.6	-59°34.1
Suhail	222°49.6	-43°30.5
Miaplacidus	221°39.5	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.0	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.8
Acrux	173°05.3	-63°12.3
Gacrux	171°56.7	-57°13.2
Alioth	166°17.5	55°51.4
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.2
Hadar	148°42.4	-60°28.0
Menkent	148°02.9	-36°27.8
Arcturus	145°51.9	19°05.4
Rigil Kent.	139°46.5	-60°54.9
Zubenelg.	137°00.9	-16°07.2
Kochab	137°20.9	74°04.8
Alphecca	126°07.6	26°39.3
Antares	112°21.1	-26°28.4
Atria	107°19.3	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°07.0
Rasalhague	96°02.5	12°33.1
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.1	-34°22.4
Vega	80°36.1	38°48.5
Nunki	75°52.9	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.2	-56°40.4
Deneb	49°28.3	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°48.9	28°11.5
Markab	13°33.8	15°18.8

2019/9/2	SHA	Mer.pass
Venus	167°39.5	12:36
Mars	185°01.1	11:25
Jupiter	103°40.1	16:49
Saturn	74°52.6	18:43

2019/9/2	SHA	Mer.pass
Venus	166°31.2	12:36
Mars	184°25.8	11:23
Jupiter	103°32.0	16:45
Saturn	74°51.8	18:39

2019/9/2	SHA	Mer.pass
Venus	165°22.8	12:37
Mars	183°50.5	11:22
Jupiter	103°23.7	16:42
Saturn	74°51.0	18:36

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	**ν**	**Dec**	**d**	**HP**
0	182°01.2	-0°39.1	231°45.5	5.6	20°04.7	-6.8	59.9
1	197°01.5	-0°40.1	246°10.1	5.6	19°57.9	-6.9	59.9
2	212°01.7	-0°41.0	260°34.7	5.6	19°50.9	-7.1	60.0
3	227°01.9	-0°42.0	274°59.3	5.6	19°43.8	-7.2	60.0
4	242°02.1	-0°43.0	289°24.0	5.6	19°36.5	-7.3	60.0
5	257°02.3	-0°44.0	303°48.6	5.7	19°29.1	-7.5	60.1
6	272°02.5	-0°44.9	318°13.3	5.7	19°21.5	-7.6	60.1
7	287°02.8	-0°45.9	332°38.0	5.7	19°13.8	-7.8	60.1
8	302°03.0	-0°46.9	347°02.7	5.7	19°06.0	-7.9	60.2
9	317°03.2	-0°47.9	1°27.4	5.7	18°58.0	-8.0	60.2
10	332°03.4	-0°48.8	15°52.1	5.8	18°49.9	-8.2	60.2
11	347°03.6	-0°49.8	30°16.9	5.8	18°41.7	-8.3	60.3
12	2°03.8	-0°50.8	44°41.7	5.8	18°33.3	-8.4	60.3
13	17°04.0	-0°51.8	59°06.5	5.8	18°24.8	-8.6	60.3
14	32°04.3	-0°52.7	73°31.3	5.8	18°16.2	-8.7	60.3
15	47°04.5	-0°53.7	87°56.2	5.9	18°07.4	-8.8	60.4
16	62°04.7	-0°54.7	102°21.0	5.9	17°58.5	-9.0	60.4
17	77°04.9	-0°55.7	116°45.9	5.9	17°49.5	-9.1	60.4
18	92°05.1	-0°56.6	131°10.9	5.9	17°40.3	-9.2	60.4
19	107°05.3	-0°57.6	145°35.8	6.0	17°31.1	-9.3	60.5
20	122°05.6	-0°58.6	160°00.8	6.0	17°21.6	-9.5	60.5
21	137°05.8	-0°59.5	174°25.8	6.0	17°12.1	-9.6	60.5
22	152°06.0	-1°00.5	188°50.9	6.1	17°02.4	-9.7	60.6
23	167°06.2	-1°01.5	203°16.0	6.1	16°52.7	-9.8	60.6
	SD.=15.9	d=-1.0			S.D.=16.3		

Thu	**GHA**	**Dec**	**GHA**	**ν**	**Dec**	**d**	**HP**
0	182°06.4	-1°02.5	217°41.1	6.1	16°42.8	-10.0	60.6
1	197°06.6	-1°03.4	232°06.2	6.2	16°32.7	-10.1	60.6
2	212°06.8	-1°04.4	246°31.4	6.2	16°22.6	-10.2	60.7
3	227°07.1	-1°05.4	260°56.6	6.2	16°12.3	-10.3	60.7
4	242°07.3	-1°06.4	275°21.8	6.3	16°01.9	-10.4	60.7
5	257°07.5	-1°07.3	289°47.1	6.3	15°51.4	-10.6	60.7
6	272°07.7	-1°08.3	304°12.4	6.3	15°40.8	-10.7	60.8
7	287°07.9	-1°09.3	318°37.8	6.4	15°30.1	-10.8	60.8
8	302°08.1	-1°10.3	333°03.1	6.4	15°19.2	-10.9	60.8
9	317°08.3	-1°11.2	347°28.6	6.4	15°08.3	-11.0	60.8
10	332°08.6	-1°12.2	1°54.0	6.5	14°57.2	-11.1	60.8
11	347°08.8	-1°13.2	16°19.5	6.5	14°46.1	-11.2	60.9
12	2°09.0	-1°14.2	30°45.0	6.5	14°34.8	-11.3	60.9
13	17°09.2	-1°15.1	45°10.6	6.6	14°23.4	-11.4	60.9
14	32°09.4	-1°16.1	59°36.2	6.6	14°11.9	-11.5	60.9
15	47°09.6	-1°17.1	74°01.8	6.7	14°00.3	-11.6	60.9
16	62°09.8	-1°18.0	88°27.5	6.7	13°48.6	-11.7	61.0
17	77°10.1	-1°19.0	102°53.2	6.7	13°36.9	-11.8	61.0
18	92°10.3	-1°20.0	117°18.9	6.8	13°25.0	-11.9	61.0
19	107°10.5	-1°21.0	131°44.7	6.8	13°13.0	-12.0	61.0
20	122°10.7	-1°21.9	146°10.5	6.8	13°00.9	-12.1	61.0
21	137°10.9	-1°22.9	160°36.4	6.9	12°48.8	-12.2	61.0
22	152°11.1	-1°23.9	175°02.3	6.9	12°36.5	-12.3	61.1
23	167°11.3	-1°24.9	189°28.2	7.0	12°24.1	-12.4	61.1
	SD.=15.9	d=-1.0			S.D.=16.5		

Fri	**GHA**	**Dec**	**GHA**	**ν**	**Dec**	**d**	**HP**
0	182°11.6	-1°25.8	203°54.2	7.0	12°11.7	-12.5	61.1
1	197°11.8	-1°26.8	218°20.2	7.0	11°59.2	-12.6	61.1
2	212°12.0	-1°27.8	232°46.2	7.1	11°46.6	-12.7	61.1
3	227°12.2	-1°28.8	247°12.3	7.1	11°33.9	-12.7	61.1
4	242°12.4	-1°29.7	261°38.4	7.1	11°21.1	-12.8	61.1
5	257°12.6	-1°30.7	276°04.6	7.2	11°08.2	-12.9	61.2
6	272°12.8	-1°31.7	290°30.8	7.2	10°55.3	-13.0	61.2
7	287°13.0	-1°32.7	304°57.1	7.3	10°42.3	-13.0	61.2
8	302°13.3	-1°33.6	319°23.3	7.3	10°29.2	-13.1	61.2
9	317°13.5	-1°34.6	333°49.6	7.3	10°16.0	-13.2	61.2
10	332°13.7	-1°35.6	348°16.0	7.4	10°02.8	-13.3	61.2
11	347°13.9	-1°36.5	2°42.4	7.4	9°49.5	-13.3	61.2
12	2°14.1	-1°37.5	17°08.8	7.4	9°36.1	-13.4	61.2
13	17°14.3	-1°38.5	31°35.3	7.5	9°22.7	-13.5	61.2
14	32°14.5	-1°39.5	46°01.8	7.5	9°09.2	-13.5	61.2
15	47°14.7	-1°40.4	60°28.3	7.6	8°55.6	-13.6	61.2
16	62°14.9	-1°41.4	74°54.9	7.6	8°42.0	-13.7	61.3
17	77°15.2	-1°42.4	89°21.5	7.6	8°28.3	-13.7	61.3
18	92°15.4	-1°43.4	103°48.1	7.7	8°14.6	-13.8	61.3
19	107°15.6	-1°44.3	118°14.8	7.7	8°00.8	-13.8	61.3
20	122°15.8	-1°45.3	132°41.5	7.7	7°46.9	-13.9	61.3
21	137°16.0	-1°46.3	147°08.3	7.8	7°33.0	-13.9	61.3
22	152°16.2	-1°47.3	161°35.0	7.8	7°19.1	-14.0	61.3
23	167°16.4	-1°48.2	176°01.9	7.8	7°05.1	-14.0	61.3
	SD.=16.0	d=-1.0			S.D.=16.7		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:20	04:47	05:55	17:46	18:53	20:19
70	03:37	04:53	05:54	17:46	18:47	20:03
68	03:50	04:58	05:54	17:47	18:42	19:50
66	03:60	05:02	05:54	17:48	18:38	19:40
64	04:08	05:06	05:53	17:48	18:35	19:32
62	04:16	05:09	05:53	17:48	18:32	19:25
60	04:22	05:11	05:53	17:49	18:30	19:19
58	04:27	05:13	05:52	17:49	18:28	19:14
56	04:31	05:15	05:52	17:49	18:26	19:10
54	04:35	05:17	05:52	17:50	18:25	19:06
52	04:39	05:18	05:52	17:50	18:23	19:03
50	04:42	05:20	05:52	17:50	18:22	19:00
45	04:48	05:22	05:51	17:51	18:20	18:54
40	04:52	05:24	05:51	17:51	18:18	18:50
35	04:56	05:25	05:51	17:52	18:17	18:46
30	04:59	05:26	05:50	17:52	18:16	18:44
20	05:02	05:28	05:50	17:53	18:15	18:40
10	05:04	05:28	05:49	17:54	18:15	18:39
0	05:03	05:27	05:48	17:55	18:15	18:39
-10	05:02	05:26	05:47	17:56	18:17	18:41
-20	04:59	05:24	05:46	17:57	18:19	18:44
-30	04:53	05:21	05:45	17:58	18:22	18:50
-35	04:49	05:19	05:44	17:59	18:24	18:54
-40	04:45	05:16	05:43	18:00	18:27	18:59
-45	04:38	05:13	05:42	18:01	18:31	19:05
-50	04:30	05:09	05:41	18:03	18:35	19:14
-52	04:26	05:07	05:40	18:04	18:37	19:18
-54	04:22	05:04	05:40	18:04	18:40	19:22
-56	04:17	05:02	05:39	18:05	18:43	19:27
-58	04:11	04:59	05:38	18:06	18:46	19:33
-60	04:05	04:55	05:37	18:07	18:49	19:40

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
72	22:56	–:–	01:51	20:08	19:15	18:47
70	23:49	–:–	02:13	19:14	18:51	18:36
68	–:–	00:22	02:29	18:40	18:33	18:27
66	–:–	00:45	02:42	18:16	18:18	18:19
64	–:–	01:04	02:53	17:56	18:06	18:12
62	–:–	01:19	03:02	17:40	17:56	18:07
60	–:–	01:31	03:10	17:27	17:47	18:01
58	00:12	01:42	03:17	17:16	17:39	17:57
56	00:24	01:51	03:23	17:06	17:32	17:53
54	00:35	01:60	03:29	16:57	17:26	17:49
52	00:45	02:07	03:34	16:49	17:20	17:46
50	00:54	02:14	03:38	16:41	17:15	17:43
45	01:12	02:28	03:47	16:26	17:04	17:37
40	01:27	02:40	03:55	16:13	16:54	17:31
35	01:39	02:50	04:02	16:02	16:46	17:26
30	01:50	02:58	04:08	15:53	16:39	17:22
20	02:09	03:13	04:18	15:36	16:27	17:15
10	02:25	03:26	04:27	15:22	16:16	17:08
0	02:40	03:38	04:35	15:08	16:06	17:02
-10	02:55	03:51	04:44	14:54	15:55	16:56
-20	03:11	04:03	04:53	14:39	15:44	16:49
-30	03:30	04:18	05:03	14:22	15:31	16:41
-35	03:40	04:27	05:08	14:12	15:24	16:37
-40	03:53	04:36	05:15	14:01	15:15	16:31
-45	04:07	04:48	05:23	13:47	15:05	16:25
-50	04:25	05:01	05:32	13:31	14:53	16:18
-52	04:33	05:08	05:36	13:23	14:47	16:15
-54	04:42	05:14	05:40	13:14	14:41	16:11
-56	04:53	05:22	05:46	13:04	14:34	16:07
-58	05:04	05:31	05:51	12:53	14:26	16:02
-60	05:18	05:41	05:58	12:40	14:17	15:57

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
25	08:05	08:15	11:51	08:53	21:23	26(15%)
26	08:26	08:36	11:51	09:52	22:20	27(8%)
27	08:46	08:56	11:51	10:48	23:16	28(3%)

September 28, 29 ,30 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	6°28.9	170°43.1	-5°37.6	189°44.0	2°29.5	109°44.2	-22°36.4	81°18.8	-22°31.1
1	21°31.3	185°42.7	-5°38.9	204°45.0	2°28.9	124°46.3	-22°36.4	96°21.3	-22°31.1
2	36°33.8	200°42.3	-5°40.1	219°46.0	2°28.2	139°48.4	-22°36.5	111°23.7	-22°31.1
3	51°36.2	215°41.9	-5°41.4	234°47.0	2°27.6	154°50.5	-22°36.5	126°26.1	-22°31.1
4	66°38.7	230°41.5	-5°42.6	249°48.0	2°26.9	169°52.6	-22°36.5	141°28.5	-22°31.1
5	81°41.2	245°41.2	-5°43.9	264°49.0	2°26.3	184°54.8	-22°36.6	156°30.9	-22°31.1
6	96°43.6	260°40.8	-5°45.1	279°50.0	2°25.6	199°56.9	-22°36.6	171°33.4	-22°31.1
7	111°46.1	275°40.4	-5°46.4	294°51.0	2°25.0	214°59.0	-22°36.6	186°35.8	-22°31.1
8	126°48.6	290°40.0	-5°47.6	309°52.0	2°24.3	230°01.1	-22°36.7	201°38.2	-22°31.1
9	141°51.0	305°39.6	-5°48.9	324°53.0	2°23.7	245°03.2	-22°36.7	216°40.6	-22°31.1
10	156°53.5	320°39.2	-5°50.1	339°54.0	2°23.0	260°05.3	-22°36.7	231°43.0	-22°31.1
11	171°56.0	335°38.8	-5°51.4	354°55.0	2°22.4	275°07.4	-22°36.8	246°45.5	-22°31.1
12	186°58.4	350°38.4	-5°52.7	9°55.9	2°21.7	290°09.5	-22°36.8	261°47.9	-22°31.1
13	202°00.9	5°38.0	-5°53.9	24°56.9	2°21.1	305°11.6	-22°36.9	276°50.3	-22°31.1
14	217°03.4	20°37.6	-5°55.2	39°57.9	2°20.4	320°13.7	-22°36.9	291°52.7	-22°31.1
15	232°05.8	35°37.2	-5°56.4	54°58.9	2°19.8	335°15.8	-22°36.9	306°55.1	-22°31.1
16	247°08.3	50°36.8	-5°57.7	69°59.9	2°19.1	350°18.0	-22°37.0	321°57.6	-22°31.1
17	262°10.7	65°36.4	-5°58.9	85°00.9	2°18.5	5°20.1	-22°37.0	336°60.0	-22°31.1
18	277°13.2	80°36.0	-6°00.2	100°01.9	2°17.9	20°22.2	-22°37.0	352°02.4	-22°31.1
19	292°15.7	95°35.6	-6°01.4	115°02.9	2°17.2	35°24.3	-22°37.1	7°04.8	-22°31.1
20	307°18.1	110°35.2	-6°02.7	130°03.9	2°16.6	50°26.4	-22°37.1	22°07.2	-22°31.1
21	322°20.6	125°34.8	-6°03.9	145°04.9	2°15.9	65°28.5	-22°37.1	37°09.6	-22°31.1
22	337°23.1	140°34.4	-6°05.2	160°05.9	2°15.3	80°30.6	-22°37.2	52°12.1	-22°31.1
23	352°25.5	155°34.0	-6°06.4	175°06.9	2°14.6	95°32.7	-22°37.2	67°14.5	-22°31.1
	Mer.pass.:23:30	v-0.4 d-1.3 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	7°28.0	170°33.6	-6°07.7	190°07.9	2°14.0	110°34.8	-22°37.3	82°16.9	-22°31.1
1	22°30.5	185°33.2	-6°08.9	205°08.9	2°13.3	125°36.9	-22°37.3	97°19.3	-22°31.1
2	37°32.9	200°32.8	-6°10.2	220°09.9	2°12.7	140°39.0	-22°37.3	112°21.7	-22°31.1
3	52°35.4	215°32.4	-6°11.4	235°10.8	2°12.0	155°41.1	-22°37.4	127°24.1	-22°31.1
4	67°37.9	230°32.0	-6°12.7	250°11.8	2°11.4	170°43.2	-22°37.4	142°26.6	-22°31.1
5	82°40.3	245°31.6	-6°13.9	265°12.8	2°10.7	185°45.3	-22°37.4	157°29.0	-22°31.1
6	97°42.8	260°31.2	-6°15.2	280°13.8	2°10.1	200°47.4	-22°37.5	172°31.4	-22°31.1
7	112°45.2	275°30.8	-6°16.4	295°14.8	2°09.4	215°49.5	-22°37.5	187°33.8	-22°31.1
8	127°47.7	290°30.4	-6°17.7	310°15.8	2°08.8	230°51.6	-22°37.5	202°36.2	-22°31.1
9	142°50.2	305°30.0	-6°18.9	325°16.8	2°08.1	245°53.7	-22°37.6	217°38.6	-22°31.1
10	157°52.6	320°29.6	-6°20.2	340°17.8	2°07.5	260°55.8	-22°37.6	232°41.1	-22°31.1
11	172°55.1	335°29.2	-6°21.4	355°18.8	2°06.8	275°58.0	-22°37.7	247°43.5	-22°31.1
12	187°57.6	350°28.8	-6°22.7	10°19.8	2°06.2	291°00.1	-22°37.7	262°45.9	-22°31.1
13	203°00.0	5°28.4	-6°23.9	25°20.8	2°05.6	306°02.2	-22°37.7	277°48.3	-22°31.1
14	218°02.5	20°28.0	-6°25.1	40°21.8	2°04.9	321°04.3	-22°37.8	292°50.7	-22°31.1
15	233°05.0	35°27.6	-6°26.4	55°22.8	2°04.3	336°06.4	-22°37.8	307°53.1	-22°31.1
16	248°07.4	50°27.2	-6°27.6	70°23.8	2°03.6	351°08.5	-22°37.8	322°55.5	-22°31.1
17	263°09.9	65°26.8	-6°28.9	85°24.8	2°03.0	6°10.6	-22°37.9	337°57.9	-22°31.1
18	278°12.3	80°26.4	-6°30.1	100°25.7	2°02.3	21°12.7	-22°37.9	353°00.4	-22°31.1
19	293°14.8	95°26.0	-6°31.4	115°26.7	2°01.7	36°14.8	-22°37.9	8°02.8	-22°31.1
20	308°17.3	110°25.6	-6°32.6	130°27.7	2°01.0	51°16.9	-22°38.0	23°05.2	-22°31.1
21	323°19.7	125°25.2	-6°33.9	145°28.7	2°00.4	66°19.0	-22°38.0	38°07.6	-22°31.1
22	338°22.2	140°24.8	-6°35.1	160°29.7	1°59.7	81°21.1	-22°38.1	53°10.0	-22°31.1
23	353°24.7	155°24.4	-6°36.4	175°30.7	1°59.1	96°23.2	-22°38.1	68°12.4	-22°31.1
	Mer.pass.:23:26	v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	8°27.1	170°24.0	-6°37.6	190°31.7	1°58.4	111°25.3	-22°38.1	83°14.8	-22°31.1
1	23°29.6	185°23.6	-6°38.8	205°32.7	1°57.8	126°27.4	-22°38.2	98°17.3	-22°31.1
2	38°32.1	200°23.2	-6°40.1	220°33.7	1°57.1	141°29.5	-22°38.2	113°19.7	-22°31.1
3	53°34.5	215°22.8	-6°41.3	235°34.7	1°56.5	156°31.6	-22°38.2	128°22.1	-22°31.1
4	68°37.0	230°22.4	-6°42.6	250°35.7	1°55.8	171°33.7	-22°38.3	143°24.5	-22°31.1
5	83°39.5	245°22.0	-6°43.8	265°36.7	1°55.2	186°35.8	-22°38.3	158°26.9	-22°31.0
6	98°41.9	260°21.6	-6°45.1	280°37.7	1°54.5	201°37.9	-22°38.3	173°29.3	-22°31.0
7	113°44.4	275°21.2	-6°46.3	295°38.7	1°53.9	216°40.0	-22°38.4	188°31.7	-22°31.0
8	128°46.8	290°20.8	-6°47.6	310°39.6	1°53.2	231°42.0	-22°38.4	203°34.1	-22°31.0
9	143°49.3	305°20.4	-6°48.8	325°40.6	1°52.6	246°44.1	-22°38.5	218°36.5	-22°31.0
10	158°51.8	320°20.0	-6°50.0	340°41.6	1°51.9	261°46.2	-22°38.5	233°39.0	-22°31.0
11	173°54.2	335°19.6	-6°51.3	355°42.6	1°51.3	276°48.3	-22°38.5	248°41.4	-22°31.0
12	188°56.7	350°19.2	-6°52.5	10°43.6	1°50.6	291°50.4	-22°38.6	263°43.8	-22°31.0
13	203°59.2	5°18.8	-6°53.8	25°44.6	1°50.0	306°52.5	-22°38.6	278°46.2	-22°31.0
14	219°01.6	20°18.3	-6°55.0	40°45.6	1°49.3	321°54.6	-22°38.6	293°48.6	-22°31.0
15	234°04.1	35°17.9	-6°56.2	55°46.6	1°48.7	336°56.7	-22°38.7	308°51.0	-22°31.0
16	249°06.6	50°17.5	-6°57.5	70°47.6	1°48.1	351°58.8	-22°38.7	323°53.4	-22°31.0
17	264°09.0	65°17.1	-6°58.7	85°48.6	1°47.4	7°00.9	-22°38.7	338°55.8	-22°31.0
18	279°11.5	80°16.7	-6°60.0	100°49.6	1°46.8	22°03.0	-22°38.8	353°58.2	-22°31.0
19	294°13.9	95°16.3	-7°01.2	115°50.6	1°46.1	37°05.1	-22°38.8	9°00.6	-22°31.0
20	309°16.4	110°15.9	-7°02.4	130°51.6	1°45.5	52°07.2	-22°38.9	24°03.0	-22°31.0
21	324°18.9	125°15.5	-7°03.7	145°52.6	1°44.8	67°09.3	-22°38.9	39°05.5	-22°31.0
22	339°21.3	140°15.1	-7°04.9	160°53.6	1°44.2	82°11.4	-22°38.9	54°07.9	-22°31.0
23	354°23.8	155°14.7	-7°06.2	175°54.5	1°43.5	97°13.5	-22°39.0	69°10.3	-22°31.0
	Mer.pass.:23:22	v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Stars	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°11.9
Schedar	349°35.1	56°38.7
Diphda	348°51.1	-17°52.7
Achernar	335°23.0	-57°08.2
Hamal	327°55.6	23°33.3
Polaris	315°33.0	89°20.5
Akamar	315°14.7	-40°13.5
Menkar	314°10.3	4°10.0
Mirfak	308°33.9	49°55.6
Aldebaran	290°44.3	16°32.9
Rigel	281°07.8	-8°10.7
Capella	280°28.0	46°00.9
Bellatrix	278°27.3	6°22.0
Elnath	278°07.1	28°37.3
Alnilam	275°41.9	-1°11.3
Betelgeuse	270°56.6	7°24.6
Canopus	263°54.2	-52°42.1
Sirius	258°29.9	-16°44.3
Adara	255°09.2	-28°59.7
Procyon	244°55.3	5°10.7
Pollux	243°22.5	27°58.6
Avior	234°16.6	-59°34.1
Suhail	222°49.6	-43°30.4
Miaplacidus	221°39.5	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.0	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.8
Acrux	173°05.3	-63°12.3
Gacrux	171°56.7	-57°13.2
Alioth	166°17.5	55°51.4
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.2
Hadar	148°42.4	-60°28.0
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.4
Rigil Kent.	139°46.5	-60°54.9
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.0	74°04.8
Alphecca	126°07.6	26°39.3
Antares	112°21.2	-26°28.4
Atria	107°19.3	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°07.0
Rasalhague	96°02.6	12°33.1
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.1	-34°22.5
Vega	80°36.1	38°48.5
Nunki	75°53.0	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.2	-56°40.4
Deneb	49°28.3	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°48.9	28°11.5
Markab	13°33.8	15°18.8

2019/9/2	SHA	Mer.pass
Venus	164°14.3	12:37
Mars	183°15.2	11:20
Jupiter	103°15.3	16:39
Saturn	74°50.0	18:32

2019/9/2	SHA	Mer.pass
Venus	163°05.6	12:38
Mars	182°39.9	11:19
Jupiter	103°06.8	16:35
Saturn	74°48.9	18:28

2019/9/3	SHA	Mer.pass
Venus	161°56.9	12:39
Mars	182°04.6	11:17
Jupiter	102°58.1	16:32
Saturn	74°47.7	18:24

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°16.6	-1°49.2	190°28.7	7.9	6°51.0	-14.1	61.3
1	197°16.8	-1°50.2	204°55.6	7.9	6°36.9	-14.1	61.3
2	212°17.1	-1°51.1	219°22.5	7.9	6°22.8	-14.2	61.3
3	227°17.3	-1°52.1	233°49.4	8.0	6°08.6	-14.2	61.3
4	242°17.5	-1°53.1	248°16.4	8.0	5°54.4	-14.2	61.3
5	257°17.7	-1°54.1	262°43.4	8.0	5°40.1	-14.3	61.3
6	272°17.9	-1°55.0	277°10.5	8.1	5°25.8	-14.3	61.3
7	287°18.1	-1°56.0	291°37.5	8.1	5°11.5	-14.3	61.3
8	302°18.3	-1°57.0	306°04.6	8.1	4°57.1	-14.4	61.3
9	317°18.5	-1°58.0	320°31.7	8.1	4°42.7	-14.4	61.3
10	332°18.7	-1°58.9	334°58.9	8.2	4°28.3	-14.4	61.3
11	347°18.9	-1°59.9	349°26.1	8.2	4°13.9	-14.5	61.3
12	2°19.2	-2°00.9	3°53.3	8.2	3°59.4	-14.5	61.3
13	17°19.4	-2°01.8	18°20.5	8.2	3°44.9	-14.5	61.2
14	32°19.6	-2°02.8	32°47.8	8.3	3°30.4	-14.5	61.2
15	47°19.8	-2°03.8	47°15.1	8.3	3°15.8	-14.5	61.2
16	62°20.0	-2°04.8	61°42.4	8.3	3°01.3	-14.6	61.2
17	77°20.2	-2°05.7	76°09.7	8.3	2°46.7	-14.6	61.2
18	92°20.4	-2°06.7	90°37.1	8.4	2°32.1	-14.6	61.2
19	107°20.6	-2°07.7	105°04.5	8.4	2°17.5	-14.6	61.2
20	122°20.8	-2°08.7	119°31.9	8.4	2°02.9	-14.6	61.2
21	137°21.0	-2°09.6	133°59.3	8.4	1°48.3	-14.6	61.2
22	152°21.2	-2°10.6	148°26.7	8.5	1°33.7	-14.6	61.2
23	167°21.5	-2°11.6	162°54.2	8.5	1°19.1	-14.6	61.2
	SD.=16.0	d=-1.0			S.D.=16.7		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°21.7	-2°12.5	177°21.7	8.5	1°04.5	-14.6	61.1
1	197°21.9	-2°13.5	191°49.2	8.5	0°49.8	-14.6	61.1
2	212°22.1	-2°14.5	206°16.8	8.5	0°35.2	-14.6	61.1
3	227°22.3	-2°15.5	220°44.3	8.6	0°20.6	-14.6	61.1
4	242°22.5	-2°16.4	235°11.9	8.6	0°05.9	-14.6	61.1
5	257°22.7	-2°17.4	249°39.5	8.6	-0°08.7	-14.6	61.1
6	272°22.9	-2°18.4	264°07.1	8.6	-0°23.3	-14.6	61.1
7	287°23.1	-2°19.4	278°34.7	8.6	-0°37.9	-14.6	61.0
8	302°23.3	-2°20.3	293°02.3	8.6	-0°52.5	-14.6	61.0
9	317°23.5	-2°21.3	307°30.0	8.7	-1°07.0	-14.6	61.0
10	332°23.7	-2°22.3	321°57.7	8.7	-1°21.6	-14.5	61.0
11	347°23.9	-2°23.2	336°25.3	8.7	-1°36.1	-14.5	61.0
12	2°24.2	-2°24.2	350°53.0	8.7	-1°50.7	-14.5	61.0
13	17°24.4	-2°25.2	5°20.7	8.7	-2°05.2	-14.5	60.9
14	32°24.6	-2°26.2	19°48.5	8.7	-2°19.6	-14.5	60.9
15	47°24.8	-2°27.1	34°16.2	8.7	-2°34.1	-14.4	60.9
16	62°25.0	-2°28.1	48°43.9	8.7	-2°48.5	-14.4	60.9
17	77°25.2	-2°29.1	63°11.7	8.8	-3°02.9	-14.4	60.9
18	92°25.4	-2°30.0	77°39.4	8.8	-3°17.3	-14.4	60.8
19	107°25.6	-2°31.0	92°07.2	8.8	-3°31.7	-14.3	60.8
20	122°25.8	-2°32.0	106°35.0	8.8	-3°46.0	-14.3	60.8
21	137°26.0	-2°33.0	121°02.8	8.8	-4°00.2	-14.3	60.8
22	152°26.2	-2°33.9	135°30.6	8.8	-4°14.5	-14.2	60.8
23	167°26.4	-2°34.9	149°58.4	8.8	-4°28.7	-14.2	60.7
	SD.=16.0	d=-1.0			S.D.=16.7		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°26.6	-2°35.9	164°26.2	8.8	-4°42.9	-14.2	60.7
1	197°26.8	-2°36.8	178°54.0	8.8	-4°57.0	-14.1	60.7
2	212°27.0	-2°37.8	193°21.8	8.8	-5°11.1	-14.1	60.7
3	227°27.2	-2°38.8	207°49.7	8.8	-5°25.1	-14.0	60.6
4	242°27.5	-2°39.8	222°17.5	8.8	-5°39.1	-14.0	60.6
5	257°27.7	-2°40.7	236°45.3	8.8	-5°53.1	-13.9	60.6
6	272°27.9	-2°41.7	251°13.2	8.8	-6°07.0	-13.9	60.5
7	287°28.1	-2°42.7	265°41.0	8.8	-6°20.8	-13.8	60.5
8	302°28.3	-2°43.6	280°08.8	8.8	-6°34.7	-13.8	60.5
9	317°28.5	-2°44.6	294°36.7	8.8	-6°48.4	-13.7	60.5
10	332°28.7	-2°45.6	309°04.5	8.8	-7°02.1	-13.7	60.4
11	347°28.9	-2°46.6	323°32.4	8.8	-7°15.7	-13.6	60.4
12	2°29.1	-2°47.5	338°00.2	8.8	-7°29.3	-13.6	60.4
13	17°29.3	-2°48.5	352°28.1	8.8	-7°42.9	-13.5	60.4
14	32°29.5	-2°49.5	6°55.9	8.8	-7°56.3	-13.4	60.3
15	47°29.7	-2°50.4	21°23.8	8.8	-8°09.7	-13.4	60.3
16	62°29.9	-2°51.4	35°51.6	8.8	-8°23.1	-13.3	60.3
17	77°30.1	-2°52.4	50°19.4	8.8	-8°36.3	-13.2	60.2
18	92°30.3	-2°53.4	64°47.3	8.8	-8°49.6	-13.2	60.2
19	107°30.5	-2°54.3	79°15.1	8.8	-9°02.7	-13.1	60.2
20	122°30.7	-2°55.3	93°42.9	8.8	-9°15.8	-13.0	60.1
21	137°30.9	-2°56.3	108°10.8	8.8	-9°28.8	-13.0	60.1
22	152°31.1	-2°57.2	122°38.6	8.8	-9°41.7	-12.9	60.1
23	167°31.3	-2°58.2	137°06.4	8.8	-9°54.6	-12.8	60.0
	SD.=16.0	d=-1.0			S.D.=16.6		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:37	05:01	06:08	17:30	18:37	20:00
70	03:51	05:05	06:06	17:33	18:33	19:47
68	04:02	05:09	06:04	17:34	18:30	19:36
66	04:11	05:12	06:03	17:36	18:27	19:28
64	04:18	05:14	06:02	17:37	18:25	19:21
62	04:24	05:17	06:01	17:39	18:23	19:15
60	04:29	05:18	05:60	17:40	18:21	19:10
58	04:34	05:20	05:59	17:41	18:20	19:05
56	04:38	05:21	05:58	17:41	18:18	19:02
54	04:41	05:22	05:58	17:42	18:17	18:59
52	04:44	05:23	05:57	17:43	18:16	18:56
50	04:46	05:24	05:56	17:44	18:16	18:53
45	04:52	05:26	05:55	17:45	18:14	18:48
40	04:55	05:27	05:54	17:46	18:13	18:45
35	04:58	05:28	05:53	17:47	18:13	18:42
30	05:00	05:28	05:52	17:48	18:12	18:40
20	05:03	05:28	05:50	17:50	18:12	18:38
10	05:03	05:28	05:49	17:52	18:13	18:37
0	05:02	05:26	05:47	17:54	18:14	18:38
-10	05:00	05:24	05:45	17:55	18:16	18:41
-20	04:56	05:22	05:44	17:57	18:20	18:45
-30	04:49	05:17	05:41	17:60	18:24	18:52
-35	04:45	05:15	05:40	18:01	18:27	18:56
-40	04:39	05:11	05:38	18:03	18:30	19:02
-45	04:32	05:07	05:37	18:05	18:35	19:09
-50	04:23	05:02	05:34	18:07	18:40	19:19
-52	04:19	04:59	05:33	18:09	18:43	19:23
-54	04:14	04:57	05:32	18:10	18:45	19:28
-56	04:08	04:53	05:31	18:11	18:49	19:34
-58	04:02	04:50	05:29	18:13	18:52	19:41
-60	03:55	04:46	05:28	18:14	18:57	19:48

	Moonrise			**Moonset**		
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	04:16	06:33	08:49	18:26	18:06	17:45
70	04:25	06:32	08:38	18:23	18:11	17:58
68	04:32	06:32	08:30	18:21	18:15	18:09
66	04:38	06:31	08:23	18:19	18:18	18:17
64	04:43	06:30	08:17	18:17	18:21	18:25
62	04:47	06:30	08:12	18:15	18:23	18:32
60	04:50	06:29	08:07	18:14	18:25	18:37
58	04:53	06:29	08:03	18:13	18:27	18:42
56	04:56	06:29	07:60	18:11	18:29	18:47
54	04:59	06:28	07:57	18:10	18:30	18:51
52	05:01	06:28	07:54	18:10	18:32	18:55
50	05:03	06:28	07:52	18:09	18:33	18:58
45	05:08	06:27	07:46	18:07	18:36	19:06
40	05:11	06:27	07:42	18:05	18:38	19:12
35	05:15	06:27	07:38	18:04	18:40	19:17
30	05:18	06:26	07:34	18:03	18:42	19:22
20	05:23	06:26	07:28	18:00	18:45	19:30
10	05:27	06:25	07:23	17:59	18:48	19:37
0	05:31	06:25	07:19	17:57	18:50	19:44
-10	05:35	06:25	07:14	17:55	18:53	19:51
-20	05:39	06:24	07:09	17:53	18:56	19:58
-30	05:44	06:24	07:03	17:50	18:59	20:06
-35	05:47	06:24	07:00	17:49	19:01	20:11
-40	05:50	06:24	06:57	17:47	19:03	20:17
-45	05:54	06:23	06:53	17:46	19:05	20:23
-50	05:58	06:23	06:48	17:43	19:08	20:31
-52	06:00	06:23	06:45	17:42	19:09	20:34
-54	06:03	06:23	06:43	17:41	19:10	20:38
-56	06:05	06:23	06:40	17:40	19:12	20:42
-58	06:08	06:23	06:37	17:39	19:14	20:47
-60	06:11	06:22	06:34	17:37	19:16	20:53

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	09:06	09:16	11:50	11:43	00:10	29(0%)
29	09:27	09:36	11:50	12:37	00:10	1(1%)
30	09:46	09:56	11:50	13:31	01:04	2(5%)

October 01, 02 ,03 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	9°26.3	170°14.3	-7°07.4	190°55.5	1°42.9	112°15.6	-22°39.0	84°12.7	-22°31.0
1	24°28.7	185°13.9	-7°08.6	205°56.5	1°42.2	127°17.7	-22°39.0	99°15.1	-22°31.0
2	39°31.2	200°13.4	-7°09.9	220°57.5	1°41.6	142°19.8	-22°39.1	114°17.5	-22°31.0
3	54°33.7	215°13.0	-7°11.1	235°58.5	1°40.9	157°21.9	-22°39.1	129°19.9	-22°31.0
4	69°36.1	230°12.6	-7°12.4	250°59.5	1°40.3	172°23.9	-22°39.1	144°22.3	-22°31.0
5	84°38.6	245°12.2	-7°13.6	266°00.5	1°39.6	187°26.0	-22°39.2	159°24.7	-22°31.0
6	99°41.1	260°11.8	-7°14.8	281°01.5	1°39.0	202°28.1	-22°39.2	174°27.1	-22°31.0
7	114°43.5	275°11.4	-7°16.1	296°02.5	1°38.3	217°30.2	-22°39.3	189°29.5	-22°31.0
8	129°46.0	290°11.0	-7°17.3	311°03.5	1°37.7	232°32.3	-22°39.3	204°31.9	-22°31.0
9	144°48.4	305°10.6	-7°18.5	326°04.5	1°37.0	247°34.4	-22°39.3	219°34.3	-22°31.0
10	159°50.9	320°10.2	-7°19.8	341°05.5	1°36.4	262°36.5	-22°39.4	234°36.7	-22°31.0
11	174°53.4	335°09.7	-7°21.0	356°06.5	1°35.7	277°38.6	-22°39.4	249°39.1	-22°31.0
12	189°55.8	350°09.3	-7°22.2	11°07.5	1°35.1	292°40.7	-22°39.4	264°41.6	-22°31.0
13	204°58.3	5°08.9	-7°23.5	26°08.4	1°34.4	307°42.8	-22°39.5	279°44.0	-22°31.0
14	220°00.8	20°08.5	-7°24.7	41°09.4	1°33.8	322°44.9	-22°39.5	294°46.4	-22°31.0
15	235°03.2	35°08.1	-7°25.9	56°10.4	1°33.1	337°46.9	-22°39.5	309°48.8	-22°31.0
16	250°05.7	50°07.7	-7°27.2	71°11.4	1°32.5	352°49.0	-22°39.6	324°51.2	-22°31.0
17	265°08.2	65°07.3	-7°28.4	86°12.4	1°31.8	7°51.1	-22°39.6	339°53.6	-22°31.0
18	280°10.6	80°06.9	-7°29.7	101°13.4	1°31.2	22°53.2	-22°39.7	354°56.0	-22°31.0
19	295°13.1	95°06.4	-7°30.9	116°14.4	1°30.5	37°55.3	-22°39.7	9°58.4	-22°31.0
20	310°15.5	110°06.0	-7°32.1	131°15.4	1°29.9	52°57.4	-22°39.7	25°00.8	-22°31.0
21	325°18.0	125°05.6	-7°33.4	146°16.4	1°29.2	67°59.5	-22°39.8	40°03.2	-22°31.0
22	340°20.5	140°05.2	-7°34.6	161°17.4	1°28.6	83°01.6	-22°39.8	55°05.6	-22°31.0
23	355°22.9	155°04.8	-7°35.8	176°18.4	1°27.9	98°03.7	-22°39.8	70°08.0	-22°31.0
Mer.pass.:23:18		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	10°25.4	170°04.4	-7°37.0	191°19.4	1°27.3	113°05.7	-22°39.9	85°10.4	-22°31.0
1	25°27.9	185°04.0	-7°38.3	206°20.4	1°26.6	128°07.8	-22°39.9	100°12.8	-22°31.0
2	40°30.3	200°03.5	-7°39.5	221°21.4	1°26.0	143°09.9	-22°39.9	115°15.2	-22°31.0
3	55°32.8	215°03.1	-7°40.7	236°22.3	1°25.3	158°12.0	-22°40.0	130°17.6	-22°31.0
4	70°35.3	230°02.7	-7°42.0	251°23.3	1°24.7	173°14.1	-22°40.0	145°20.0	-22°31.0
5	85°37.7	245°02.3	-7°43.2	266°24.3	1°24.0	188°16.2	-22°40.1	160°22.4	-22°31.0
6	100°40.2	260°01.9	-7°44.4	281°25.3	1°23.4	203°18.3	-22°40.1	175°24.8	-22°31.0
7	115°42.7	275°01.5	-7°45.7	296°26.3	1°22.7	218°20.3	-22°40.1	190°27.2	-22°31.0
8	130°45.1	290°01.0	-7°46.9	311°27.3	1°22.1	233°22.4	-22°40.2	205°29.6	-22°31.0
9	145°47.6	305°00.6	-7°48.1	326°28.3	1°21.4	248°24.5	-22°40.2	220°32.0	-22°31.0
10	160°50.0	320°00.2	-7°49.4	341°29.3	1°20.8	263°26.6	-22°40.2	235°34.4	-22°31.0
11	175°52.5	334°59.8	-7°50.6	356°30.3	1°20.1	278°28.7	-22°40.3	250°36.8	-22°31.0
12	190°55.0	349°59.4	-7°51.8	11°31.3	1°19.5	293°30.8	-22°40.3	265°39.2	-22°31.0
13	205°57.4	4°58.9	-7°53.0	26°32.3	1°18.8	308°32.9	-22°40.3	280°41.6	-22°31.0
14	220°59.9	19°58.5	-7°54.3	41°33.3	1°18.2	323°34.9	-22°40.4	295°44.0	-22°31.0
15	236°02.4	34°58.1	-7°55.5	56°34.3	1°17.5	338°37.0	-22°40.4	310°46.4	-22°31.0
16	251°04.8	49°57.7	-7°56.7	71°35.3	1°16.9	353°39.1	-22°40.5	325°48.8	-22°31.0
17	266°07.3	64°57.3	-7°58.0	86°36.2	1°16.3	8°41.2	-22°40.5	340°51.2	-22°31.0
18	281°09.8	79°56.9	-7°59.2	101°37.2	1°15.6	23°43.3	-22°40.5	355°53.6	-22°31.0
19	296°12.2	94°56.4	-8°00.4	116°38.2	1°15.0	38°45.4	-22°40.6	10°56.0	-22°30.9
20	311°14.7	109°56.0	-8°01.6	131°39.2	1°14.3	53°47.4	-22°40.6	25°58.4	-22°30.9
21	326°17.2	124°55.6	-8°02.9	146°40.2	1°13.7	68°49.5	-22°40.6	41°00.8	-22°30.9
22	341°19.6	139°55.2	-8°04.1	161°41.2	1°13.0	83°51.6	-22°40.7	56°03.2	-22°30.9
23	356°22.1	154°54.7	-8°05.3	176°42.2	1°12.4	98°53.7	-22°40.7	71°05.6	-22°30.9
Mer.pass.:23:14		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	11°24.5	169°54.3	-8°06.5	191°43.2	1°11.7	113°55.8	-22°40.7	86°08.0	-22°30.9
1	26°27.0	184°53.9	-8°07.8	206°44.2	1°11.1	128°57.9	-22°40.8	101°10.4	-22°30.9
2	41°29.5	199°53.5	-8°09.0	221°45.2	1°10.4	143°59.9	-22°40.8	116°12.8	-22°30.9
3	56°31.9	214°53.1	-8°10.2	236°46.2	1°09.8	159°02.0	-22°40.9	131°15.2	-22°30.9
4	71°34.4	229°52.6	-8°11.4	251°47.2	1°09.1	174°04.1	-22°40.9	146°17.6	-22°30.9
5	86°36.9	244°52.2	-8°12.7	266°48.2	1°08.5	189°06.2	-22°40.9	161°20.0	-22°30.9
6	101°39.3	259°51.8	-8°13.9	281°49.2	1°07.8	204°08.3	-22°41.0	176°22.4	-22°30.9
7	116°41.8	274°51.4	-8°15.1	296°50.1	1°07.2	219°10.3	-22°41.0	191°24.8	-22°30.9
8	131°44.3	289°50.9	-8°16.3	311°51.1	1°06.5	234°12.4	-22°41.0	206°27.2	-22°30.9
9	146°46.7	304°50.5	-8°17.5	326°52.1	1°05.9	249°14.5	-22°41.1	221°29.6	-22°30.9
10	161°49.2	319°50.1	-8°18.8	341°53.1	1°05.2	264°16.6	-22°41.1	236°32.0	-22°30.9
11	176°51.7	334°49.7	-8°20.0	356°54.1	1°04.6	279°18.7	-22°41.1	251°34.4	-22°30.9
12	191°54.1	349°49.2	-8°21.2	11°55.1	1°03.9	294°20.7	-22°41.2	266°36.8	-22°30.9
13	206°56.6	4°48.8	-8°22.4	26°56.1	1°03.3	309°22.8	-22°41.2	281°39.2	-22°30.9
14	221°59.0	19°48.4	-8°23.7	41°57.1	1°02.6	324°24.9	-22°41.3	296°41.6	-22°30.9
15	237°01.5	34°48.0	-8°24.9	56°58.1	1°02.0	339°27.0	-22°41.3	311°44.0	-22°30.9
16	252°04.0	49°47.5	-8°26.1	71°59.1	1°01.3	354°29.0	-22°41.3	326°46.4	-22°30.9
17	267°06.4	64°47.1	-8°27.3	87°00.1	1°00.7	9°31.1	-22°41.4	341°48.8	-22°30.9
18	282°08.9	79°46.7	-8°28.5	102°01.1	1°00.0	24°33.2	-22°41.4	356°51.2	-22°30.9
19	297°11.4	94°46.3	-8°29.8	117°02.1	0°59.4	39°35.3	-22°41.4	11°53.6	-22°30.9
20	312°13.8	109°45.8	-8°31.0	132°03.0	0°58.7	54°37.4	-22°41.5	26°56.0	-22°30.9
21	327°16.3	124°45.4	-8°32.2	147°04.0	0°58.1	69°39.4	-22°41.5	41°58.4	-22°30.9
22	342°18.8	139°45.0	-8°33.4	162°05.0	0°57.4	84°41.5	-22°41.6	57°00.8	-22°30.9
23	357°21.2	154°44.5	-8°34.6	177°06.0	0°56.8	99°43.6	-22°41.6	72°03.2	-22°30.9
Mer.pass.:23:10		v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.7
Diphda	348°51.1	-17°52.7
Achernar	335°23.0	-57°08.2
Hamal	327°55.6	23°33.3
Polaris	315°31.9	89°20.6
Akamar	315°14.7	-40°13.5
Menkar	314°10.3	4°10.0
Mirfak	308°33.8	49°55.6
Aldebaran	290°44.3	16°32.9
Rigel	281°07.8	-8°10.7
Capella	280°28.0	46°00.9
Bellatrix	278°27.3	6°22.0
Elnath	278°07.1	28°37.3
Alnilam	275°41.9	-1°11.3
Betelgeuse	270°56.6	7°24.6
Canopus	263°54.2	-52°42.1
Sirius	258°29.9	-16°44.3
Adara	255°09.2	-28°59.7
Procyon	244°55.2	5°10.7
Pollux	243°22.5	27°58.6
Avior	234°16.6	-59°34.0
Suhail	222°49.6	-43°30.4
Miaplacidus	221°39.4	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.2	11°52.4
Dubhe	193°47.0	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.8
Acrux	173°05.3	-63°12.3
Gacrux	171°56.7	-57°13.2
Alioth	166°17.5	55°51.4
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.2
Hadar	148°42.4	-60°28.0
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.4
Rigil Kent.	139°46.5	-60°54.9
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.0	74°04.8
Alphecca	126°07.6	26°39.3
Antares	112°21.2	-26°28.4
Atria	107°19.4	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°07.0
Rasalhague	96°02.6	12°33.1
Etamin	90°44.2	51°29.6
Kaus Aust.	83°38.1	-34°22.4
Vega	80°36.1	38°48.5
Nunki	75°53.0	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.2	-56°40.4
Deneb	49°28.4	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°48.9	28°11.5
Markab	13°33.8	15°18.8

2019/10/	SHA	Mer.pass
Venus	160°48.0	12:39
Mars	181°29.3	11:16
Jupiter	102°49.3	16:29
Saturn	74°46.4	18:20

2019/10/	SHA	Mer.pass
Venus	159°39.0	12:40
Mars	180°54.0	11:14
Jupiter	102°40.3	16:25
Saturn	74°45.0	18:16

2019/10/	SHA	Mer.pass
Venus	158°29.8	12:41
Mars	180°18.7	11:12
Jupiter	102°31.2	16:22
Saturn	74°43.5	18:13

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°31.5	-2°59.2	151°34.2	8.8	-10°07.4	-12.8	60.0
1	197°31.7	-3°00.2	166°02.0	8.8	-10°20.1	-12.7	60.0
2	212°31.9	-3°01.1	180°29.8	8.8	-10°32.7	-12.6	59.9
3	227°32.1	-3°02.1	194°57.7	8.8	-10°45.3	-12.5	59.9
4	242°32.3	-3°03.1	209°25.4	8.8	-10°57.8	-12.4	59.9
5	257°32.5	-3°04.0	223°53.2	8.8	-11°10.2	-12.4	59.8
6	272°32.8	-3°05.0	238°21.0	8.8	-11°22.5	-12.3	59.8
7	287°33.0	-3°06.0	252°48.8	8.8	-11°34.7	-12.2	59.8
8	302°33.2	-3°06.9	267°16.6	8.8	-11°46.9	-12.1	59.7
9	317°33.4	-3°07.9	281°44.3	8.8	-11°58.9	-12.0	59.7
10	332°33.6	-3°08.9	296°12.1	8.8	-12°10.9	-11.9	59.7
11	347°33.8	-3°09.9	310°39.8	8.7	-12°22.8	-11.9	59.6
12	2°34.0	-3°10.8	325°07.6	8.7	-12°34.6	-11.8	59.6
13	17°34.2	-3°11.8	339°35.3	8.7	-12°46.3	-11.7	59.5
14	32°34.4	-3°12.8	354°03.0	8.7	-12°58.0	-11.6	59.5
15	47°34.6	-3°13.7	8°30.7	8.7	-13°09.5	-11.5	59.5
16	62°34.8	-3°14.7	22°58.5	8.7	-13°20.9	-11.4	59.4
17	77°35.0	-3°15.7	37°26.2	8.7	-13°32.3	-11.3	59.4
18	92°35.2	-3°16.6	51°53.9	8.7	-13°43.5	-11.2	59.4
19	107°35.4	-3°17.6	66°21.5	8.7	-13°54.7	-11.1	59.3
20	122°35.6	-3°18.6	80°49.2	8.7	-14°05.8	-11.0	59.3
21	137°35.8	-3°19.5	95°16.9	8.7	-14°16.7	-10.9	59.2
22	152°36.0	-3°20.5	109°44.5	8.7	-14°27.6	-10.8	59.2
23	167°36.2	-3°21.5	124°12.2	8.6	-14°38.4	-10.7	59.2
	SD.=16.0	d=-1.0			S.D.=16.4		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°36.4	-3°22.5	138°39.8	8.6	-14°49.0	-10.6	59.1
1	197°36.6	-3°23.4	153°07.5	8.6	-14°59.6	-10.5	59.1
2	212°36.8	-3°24.4	167°35.1	8.6	-15°10.0	-10.4	59.0
3	227°37.0	-3°25.4	182°02.7	8.6	-15°20.4	-10.3	59.0
4	242°37.2	-3°26.3	196°30.3	8.6	-15°30.6	-10.2	59.0
5	257°37.4	-3°27.3	210°57.9	8.6	-15°40.8	-10.1	58.9
6	272°37.6	-3°28.3	225°25.5	8.6	-15°50.8	-10.0	58.9
7	287°37.8	-3°29.2	239°53.1	8.6	-16°00.8	-9.9	58.9
8	302°38.0	-3°30.2	254°20.7	8.6	-16°10.6	-9.8	58.8
9	317°38.2	-3°31.2	268°48.2	8.6	-16°20.3	-9.7	58.8
10	332°38.4	-3°32.1	283°15.8	8.6	-16°29.9	-9.6	58.7
11	347°38.6	-3°33.1	297°43.3	8.5	-16°39.4	-9.4	58.7
12	2°38.8	-3°34.1	312°10.9	8.5	-16°48.8	-9.3	58.7
13	17°39.0	-3°35.0	326°38.4	8.5	-16°58.1	-9.2	58.6
14	32°39.2	-3°36.0	341°06.0	8.5	-17°07.2	-9.1	58.6
15	47°39.4	-3°37.0	355°33.5	8.5	-17°16.3	-9.0	58.5
16	62°39.6	-3°37.9	10°01.0	8.5	-17°25.2	-8.9	58.5
17	77°39.8	-3°38.9	24°28.5	8.5	-17°34.1	-8.8	58.5
18	92°40.0	-3°39.9	38°56.0	8.5	-17°42.8	-8.7	58.4
19	107°40.2	-3°40.9	53°23.5	8.5	-17°51.4	-8.5	58.4
20	122°40.4	-3°41.8	67°51.0	8.5	-17°59.8	-8.4	58.3
21	137°40.5	-3°42.8	82°18.5	8.5	-18°08.2	-8.3	58.3
22	152°40.7	-3°43.8	96°46.0	8.5	-18°16.4	-8.2	58.3
23	167°40.9	-3°44.7	111°13.5	8.5	-18°24.6	-8.1	58.2
	SD.=16.0	d=-1.0			S.D.=16.1		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°41.1	-3°45.7	125°41.0	8.5	-18°32.6	-7.9	58.2
1	197°41.3	-3°46.7	140°08.4	8.5	-18°40.5	-7.8	58.1
2	212°41.5	-3°47.6	154°35.9	8.5	-18°48.2	-7.7	58.1
3	227°41.7	-3°48.6	169°03.4	8.5	-18°55.9	-7.6	58.1
4	242°41.9	-3°49.6	183°30.8	8.5	-19°03.4	-7.5	58.0
5	257°42.1	-3°50.5	197°58.3	8.5	-19°10.8	-7.4	58.0
6	272°42.3	-3°51.5	212°25.8	8.5	-19°18.1	-7.2	57.9
7	287°42.5	-3°52.5	226°53.2	8.5	-19°25.3	-7.1	57.9
8	302°42.7	-3°53.4	241°20.7	8.5	-19°32.3	-7.0	57.9
9	317°42.9	-3°54.4	255°48.2	8.5	-19°39.3	-6.9	57.8
10	332°43.1	-3°55.4	270°15.6	8.5	-19°46.1	-6.7	57.8
11	347°43.3	-3°56.3	284°43.1	8.5	-19°52.7	-6.6	57.7
12	2°43.5	-3°57.3	299°10.5	8.5	-19°59.3	-6.5	57.7
13	17°43.7	-3°58.3	313°38.0	8.5	-20°05.7	-6.4	57.7
14	32°43.9	-3°59.2	328°05.5	8.5	-20°12.0	-6.2	57.6
15	47°44.1	-4°00.2	342°33.0	8.5	-20°18.2	-6.1	57.6
16	62°44.3	-4°01.2	357°00.4	8.5	-20°24.3	-6.0	57.5
17	77°44.5	-4°02.1	11°27.9	8.5	-20°30.2	-5.9	57.5
18	92°44.7	-4°03.1	25°55.4	8.5	-20°36.0	-5.7	57.5
19	107°44.9	-4°04.1	40°22.9	8.5	-20°41.7	-5.6	57.4
20	122°45.1	-4°05.0	54°50.4	8.5	-20°47.3	-5.5	57.4
21	137°45.3	-4°06.0	69°17.9	8.5	-20°52.7	-5.4	57.3
22	152°45.4	-4°07.0	83°45.4	8.5	-20°58.0	-5.2	57.3
23	167°45.6	-4°07.9	98°13.0	8.5	-21°03.2	-5.1	57.3
	SD.=16.0	d=-1.0			S.D.=15.9		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	03:52	05:14	06:22	17:15	18:22	19:43
70	04:04	05:17	06:18	17:19	18:19	19:32
68	04:13	05:20	06:15	17:22	18:17	19:23
66	04:21	05:22	06:13	17:25	18:15	19:16
64	04:27	05:23	06:10	17:27	18:14	19:10
62	04:32	05:24	06:09	17:29	18:13	19:05
60	04:37	05:25	06:07	17:31	18:12	19:00
58	04:41	05:26	06:05	17:32	18:11	18:57
56	04:44	05:27	06:04	17:34	18:10	18:54
54	04:47	05:28	06:03	17:35	18:10	18:51
52	04:49	05:28	06:02	17:36	18:10	18:49
50	04:51	05:29	06:01	17:37	18:09	18:47
45	04:55	05:29	05:59	17:39	18:09	18:43
40	04:58	05:30	05:57	17:41	18:08	18:40
35	05:01	05:30	05:55	17:43	18:08	18:38
30	05:02	05:30	05:54	17:45	18:09	18:36
20	05:03	05:29	05:51	17:48	18:10	18:35
10	05:03	05:28	05:49	17:50	18:11	18:36
0	05:01	05:25	05:46	17:53	18:13	18:37
-10	04:58	05:23	05:44	17:55	18:16	18:41
-20	04:53	05:19	05:41	17:58	18:20	18:46
-30	04:46	05:14	05:38	18:02	18:26	18:54
-35	04:41	05:10	05:36	18:04	18:29	18:59
-40	04:34	05:06	05:34	18:06	18:33	19:05
-45	04:26	05:01	05:31	18:09	18:38	19:13
-50	04:16	04:55	05:28	18:12	18:45	19:24
-52	04:11	04:52	05:26	18:14	18:48	19:29
-54	04:06	04:49	05:25	18:15	18:51	19:35
-56	03:60	04:45	05:23	18:17	18:55	19:41
-58	03:52	04:41	05:21	18:19	18:59	19:48
-60	03:44	04:36	05:19	18:22	19:04	19:57

	Moonrise			Moonset		
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	11:11	14:09	–:–	17:16	16:11	–:–
70	10:47	13:05	–:–	17:42	17:16	–:–
68	10:29	12:30	14:37	18:02	17:53	17:39
66	10:14	12:05	13:52	18:18	18:19	18:24
64	10:02	11:45	13:23	18:31	18:39	18:53
62	09:52	11:29	13:01	18:42	18:56	19:16
60	09:43	11:16	12:43	18:51	19:10	19:34
58	09:36	11:05	12:28	18:60	19:21	19:49
56	09:29	10:55	12:16	19:07	19:32	20:03
54	09:23	10:47	12:05	19:14	19:41	20:14
52	09:18	10:39	11:55	19:20	19:49	20:24
50	09:13	10:32	11:46	19:25	19:56	20:33
45	09:03	10:18	11:28	19:37	20:12	20:52
40	08:55	10:06	11:13	19:47	20:25	21:08
35	08:47	09:55	11:01	19:55	20:36	21:21
30	08:41	09:46	10:50	20:03	20:46	21:32
20	08:30	09:31	10:31	20:16	21:03	21:52
10	08:21	09:18	10:15	20:27	21:18	22:09
0	08:12	09:06	09:60	20:37	21:31	22:25
-10	08:03	08:53	09:44	20:48	21:45	22:41
-20	07:54	08:40	09:28	20:59	21:60	22:59
-30	07:44	08:26	09:10	21:12	22:17	23:19
-35	07:38	08:17	08:60	21:20	22:27	23:30
-40	07:31	08:07	08:47	21:29	22:38	23:44
-45	07:23	07:56	08:33	21:39	22:52	23:59
-50	07:13	07:42	08:16	21:51	23:08	–:–
-52	07:09	07:36	08:08	21:57	23:16	–:–
-54	07:04	07:29	07:59	22:03	23:24	–:–
-56	06:59	07:21	07:49	22:10	23:34	–:–
-58	06:53	07:13	07:37	22:18	23:45	–:–
-60	06:47	07:03	07:24	22:27	23:58	–:–

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
1	10:06	10:16	11:49	14:24	01:57	3(11%)
2	10:25	10:35	11:49	15:18	02:51	4(19%)
3	10:44	10:54	11:49	16:12	03:45	5(28%)

October 04, 05 ,06 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	12°23.7	169°44.1	-8°35.8	192°07.0	0°56.1	114°45.7	-22°41.6	87°05.6	-22°30.9
1	27°26.1	184°43.7	-8°37.1	207°08.0	0°55.5	129°47.7	-22°41.7	102°07.9	-22°30.9
2	42°28.6	199°43.3	-8°38.3	222°09.0	0°54.8	144°49.8	-22°41.7	117°10.3	-22°30.9
3	57°31.1	214°42.8	-8°39.5	237°10.0	0°54.2	159°51.9	-22°41.7	132°12.7	-22°30.9
4	72°33.5	229°42.4	-8°40.7	252°11.0	0°53.5	174°54.0	-22°41.8	147°15.1	-22°30.9
5	87°36.0	244°42.0	-8°41.9	267°12.0	0°52.9	189°56.0	-22°41.8	162°17.5	-22°30.9
6	102°38.5	259°41.5	-8°43.1	282°13.0	0°52.2	204°58.1	-22°41.8	177°19.9	-22°30.9
7	117°40.9	274°41.1	-8°44.4	297°14.0	0°51.6	220°00.2	-22°41.9	192°22.3	-22°30.9
8	132°43.4	289°40.7	-8°45.6	312°15.0	0°50.9	235°02.3	-22°41.9	207°24.7	-22°30.9
9	147°45.9	304°40.2	-8°46.8	327°15.9	0°50.3	250°04.3	-22°42.0	222°27.1	-22°30.9
10	162°48.3	319°39.8	-8°48.0	342°16.9	0°49.6	265°06.4	-22°42.0	237°29.5	-22°30.8
11	177°50.8	334°39.4	-8°49.2	357°17.9	0°49.0	280°08.5	-22°42.0	252°31.9	-22°30.8
12	192°53.3	349°39.0	-8°50.4	12°18.9	0°48.3	295°10.6	-22°42.1	267°34.3	-22°30.8
13	207°55.7	4°38.5	-8°51.6	27°19.9	0°47.7	310°12.6	-22°42.1	282°36.7	-22°30.8
14	222°58.2	19°38.1	-8°52.9	42°20.9	0°47.0	325°14.7	-22°42.1	297°39.1	-22°30.8
15	238°00.6	34°37.7	-8°54.1	57°21.9	0°46.4	340°16.8	-22°42.2	312°41.5	-22°30.8
16	253°03.1	49°37.2	-8°55.3	72°22.9	0°45.7	355°18.8	-22°42.2	327°43.8	-22°30.8
17	268°05.6	64°36.8	-8°56.5	87°23.9	0°45.1	10°20.9	-22°42.2	342°46.2	-22°30.8
18	283°08.0	79°36.4	-8°57.7	102°24.9	0°44.4	25°23.0	-22°42.3	357°48.6	-22°30.8
19	298°10.5	94°35.9	-8°58.9	117°25.9	0°43.8	40°25.1	-22°42.3	12°51.0	-22°30.8
20	313°13.0	109°35.5	-9°00.1	132°26.9	0°43.1	55°27.1	-22°42.4	27°53.4	-22°30.8
21	328°15.4	124°35.0	-9°01.3	147°27.8	0°42.5	70°29.2	-22°42.4	42°55.8	-22°30.8
22	343°17.9	139°34.6	-9°02.6	162°28.8	0°41.8	85°31.3	-22°42.4	57°58.2	-22°30.8
23	358°20.4	154°34.2	-9°03.8	177°29.8	0°41.2	100°33.3	-22°42.5	73°00.6	-22°30.8
	Mer.pass.:23:06	v-0.4 d-1.2 m-3.8		v1.0 d-0.6 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	13°22.8	169°33.7	-9°05.0	192°30.8	0°40.5	115°35.4	-22°42.5	88°03.0	-22°30.8
1	28°25.3	184°33.3	-9°06.2	207°31.8	0°39.9	130°37.5	-22°42.5	103°05.4	-22°30.8
2	43°27.8	199°32.9	-9°07.4	222°32.8	0°39.2	145°39.6	-22°42.6	118°07.8	-22°30.8
3	58°30.2	214°32.4	-9°08.6	237°33.8	0°38.6	160°41.6	-22°42.6	133°10.1	-22°30.8
4	73°32.7	229°32.0	-9°09.8	252°34.8	0°37.9	175°43.7	-22°42.6	148°12.5	-22°30.8
5	88°35.1	244°31.6	-9°11.0	267°35.8	0°37.3	190°45.8	-22°42.7	163°14.9	-22°30.8
6	103°37.6	259°31.1	-9°12.2	282°36.8	0°36.6	205°47.8	-22°42.7	178°17.3	-22°30.8
7	118°40.1	274°30.7	-9°13.4	297°37.8	0°36.0	220°49.9	-22°42.8	193°19.7	-22°30.8
8	133°42.5	289°30.2	-9°14.6	312°38.8	0°35.3	235°52.0	-22°42.8	208°22.1	-22°30.8
9	148°45.0	304°29.8	-9°15.8	327°39.7	0°34.7	250°54.0	-22°42.8	223°24.5	-22°30.8
10	163°47.5	319°29.4	-9°17.0	342°40.7	0°34.0	265°56.1	-22°42.9	238°26.9	-22°30.8
11	178°49.9	334°28.9	-9°18.3	357°41.7	0°33.4	280°58.2	-22°42.9	253°29.3	-22°30.8
12	193°52.4	349°28.5	-9°19.5	12°42.7	0°32.7	296°00.2	-22°42.9	268°31.6	-22°30.8
13	208°54.9	4°28.0	-9°20.7	27°43.7	0°32.1	311°02.3	-22°43.0	283°34.0	-22°30.8
14	223°57.3	19°27.6	-9°21.9	42°44.7	0°31.4	326°04.4	-22°43.0	298°36.4	-22°30.8
15	238°59.8	34°27.2	-9°23.1	57°45.7	0°30.8	341°06.4	-22°43.1	313°38.8	-22°30.8
16	254°02.3	49°26.7	-9°24.3	72°46.7	0°30.1	356°08.5	-22°43.1	328°41.2	-22°30.8
17	269°04.7	64°26.3	-9°25.5	87°47.7	0°29.5	11°10.6	-22°43.1	343°43.6	-22°30.7
18	284°07.2	79°25.8	-9°26.7	102°48.7	0°28.8	26°12.6	-22°43.2	358°46.0	-22°30.7
19	299°09.6	94°25.4	-9°27.9	117°49.7	0°28.2	41°14.7	-22°43.2	13°48.4	-22°30.7
20	314°12.1	109°25.0	-9°29.1	132°50.7	0°27.5	56°16.8	-22°43.2	28°50.7	-22°30.7
21	329°14.6	124°24.5	-9°30.3	147°51.6	0°26.9	71°18.8	-22°43.3	43°53.1	-22°30.7
22	344°17.0	139°24.1	-9°31.5	162°52.6	0°26.2	86°20.9	-22°43.3	58°55.5	-22°30.7
23	359°19.5	154°23.6	-9°32.7	177°53.6	0°25.6	101°23.0	-22°43.3	73°57.9	-22°30.7
	Mer.pass.:23:02	v-0.4 d-1.2 m-3.8		v1.0 d-0.7 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	14°22.0	169°23.2	-9°33.9	192°54.6	0°24.9	116°25.0	-22°43.4	89°00.3	-22°30.7
1	29°24.4	184°22.7	-9°35.1	207°55.6	0°24.3	131°27.1	-22°43.4	104°02.7	-22°30.7
2	44°26.9	199°22.3	-9°36.3	222°56.6	0°23.6	146°29.2	-22°43.5	119°05.1	-22°30.7
3	59°29.4	214°21.9	-9°37.5	237°57.6	0°23.0	161°31.2	-22°43.5	134°07.4	-22°30.7
4	74°31.8	229°21.4	-9°38.7	252°58.6	0°22.3	176°33.3	-22°43.5	149°09.8	-22°30.7
5	89°34.3	244°21.0	-9°39.9	267°59.6	0°21.7	191°35.3	-22°43.6	164°12.2	-22°30.7
6	104°36.7	259°20.5	-9°41.1	283°00.6	0°21.0	206°37.4	-22°43.6	179°14.6	-22°30.7
7	119°39.2	274°20.1	-9°42.3	298°01.6	0°20.4	221°39.5	-22°43.6	194°17.0	-22°30.7
8	134°41.7	289°19.6	-9°43.5	313°02.6	0°19.7	236°41.5	-22°43.7	209°19.4	-22°30.7
9	149°44.1	304°19.2	-9°44.7	328°03.5	0°19.1	251°43.6	-22°43.7	224°21.7	-22°30.7
10	164°46.6	319°18.7	-9°45.9	343°04.5	0°18.4	266°45.7	-22°43.7	239°24.1	-22°30.7
11	179°49.1	334°18.3	-9°47.1	358°05.5	0°17.8	281°47.7	-22°43.8	254°26.5	-22°30.7
12	194°51.5	349°17.8	-9°48.3	13°06.5	0°17.1	296°49.8	-22°43.8	269°28.9	-22°30.7
13	209°54.0	4°17.4	-9°49.5	28°07.5	0°16.5	311°51.9	-22°43.9	284°31.3	-22°30.7
14	224°56.5	19°16.9	-9°50.7	43°08.5	0°15.8	326°53.9	-22°43.9	299°33.7	-22°30.7
15	239°58.9	34°16.5	-9°51.9	58°09.5	0°15.2	341°56.0	-22°43.9	314°36.1	-22°30.7
16	255°01.4	49°16.0	-9°53.1	73°10.5	0°14.5	356°58.0	-22°44.0	329°38.4	-22°30.7
17	270°03.9	64°15.6	-9°54.3	88°11.5	0°13.8	12°00.1	-22°44.0	344°40.8	-22°30.7
18	285°06.3	79°15.1	-9°55.4	103°12.5	0°13.2	27°02.2	-22°44.0	359°43.2	-22°30.7
19	300°08.8	94°14.7	-9°56.6	118°13.5	0°12.5	42°04.2	-22°44.1	14°45.6	-22°30.7
20	315°11.2	109°14.2	-9°57.8	133°14.4	0°11.9	57°06.3	-22°44.1	29°48.0	-22°30.6
21	330°13.7	124°13.8	-9°59.0	148°15.4	0°11.2	72°08.3	-22°44.2	44°50.3	-22°30.6
22	345°16.2	139°13.3	-10°00.2	163°16.4	0°10.6	87°10.4	-22°44.2	59°52.7	-22°30.6
23	0°18.6	154°12.9	-10°01.4	178°17.4	0°09.9	102°12.5	-22°44.2	74°55.1	-22°30.6
	Mer.pass.:22:58	v-0.4 d-1.2 m-3.8		v1.0 d-0.7 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.7
Diphda	348°51.1	-17°52.7
Achernar	335°23.0	-57°08.2
Hamal	327°55.6	23°33.3
Polaris	315°30.8	89°20.6
Akamar	315°14.7	-40°13.5
Menkar	314°10.3	4°10.0
Mirfak	308°33.8	49°55.6
Aldebaran	290°44.3	16°32.9
Rigel	281°07.8	-8°10.7
Capella	280°27.9	46°00.9
Bellatrix	278°27.3	6°22.0
Elnath	278°07.1	28°37.3
Alnilam	275°41.9	-1°11.3
Betelgeuse	270°56.6	7°24.6
Canopus	263°54.2	-52°42.1
Sirius	258°29.8	-16°44.3
Adara	255°09.1	-28°59.7
Procyon	244°55.2	5°10.7
Pollux	243°22.5	27°58.6
Avior	234°16.5	-59°34.0
Suhail	222°49.5	-43°30.4
Miaplacidus	221°39.4	-69°47.6
Alphard	217°52.1	-8°44.5
Regulus	207°39.1	11°52.4
Dubhe	193°47.0	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.8
Acrux	173°05.3	-63°12.3
Gacrux	171°56.7	-57°13.2
Alioth	166°17.5	55°51.4
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.2
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.4
Rigil Kent.	139°46.5	-60°54.9
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.0	74°04.8
Alphecca	126°07.6	26°39.3
Antares	112°21.2	-26°28.4
Atria	107°19.4	-69°03.8
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°07.0
Rasalhague	96°02.6	12°33.1
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.1	-34°22.4
Vega	80°36.1	38°48.5
Nunki	75°53.0	-26°16.2
Altair	62°04.0	8°55.4
Peacock	53°12.2	-56°40.4
Deneb	49°28.4	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°48.9	28°11.5
Markab	13°33.8	15°18.8

2019/10/	**SHA**	**Mer.pass**
Venus	157°20.4	12:41
Mars	179°43.3	11:11
Jupiter	102°22.0	16:19
Saturn	74°41.9	18:09

2019/10/	**SHA**	**Mer.pass**
Venus	156°10.9	12:42
Mars	179°08.0	11:09
Jupiter	102°12.6	16:15
Saturn	74°40.1	18:05

2019/10/	**SHA**	**Mer.pass**
Venus	155°01.2	12:43
Mars	178°32.7	11:08
Jupiter	102°03.1	16:12
Saturn	74°38.3	18:01

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°45.8	-4°08.9	112°40.5	8.5	-21°08.3	-5.0	57.2
1	197°46.0	-4°09.8	127°08.0	8.5	-21°13.2	-4.9	57.2
2	212°46.2	-4°10.8	141°35.6	8.6	-21°18.0	-4.7	57.1
3	227°46.4	-4°11.8	156°03.1	8.6	-21°22.7	-4.6	57.1
4	242°46.6	-4°12.7	170°30.7	8.6	-21°27.2	-4.5	57.1
5	257°46.8	-4°13.7	184°58.3	8.6	-21°31.6	-4.4	57.0
6	272°47.0	-4°14.7	199°25.9	8.6	-21°35.9	-4.2	57.0
7	287°47.2	-4°15.6	213°53.5	8.6	-21°40.1	-4.1	57.0
8	302°47.4	-4°16.6	228°21.1	8.6	-21°44.2	-4.0	56.9
9	317°47.6	-4°17.6	242°48.8	8.6	-21°48.1	-3.9	56.9
10	332°47.8	-4°18.5	257°16.4	8.7	-21°51.9	-3.7	56.8
11	347°48.0	-4°19.5	271°44.1	8.7	-21°55.5	-3.6	56.8
12	2°48.2	-4°20.5	286°11.8	8.7	-21°59.1	-3.5	56.8
13	17°48.3	-4°21.4	300°39.5	8.7	-22°02.5	-3.3	56.7
14	32°48.5	-4°22.4	315°07.2	8.7	-22°05.8	-3.2	56.7
15	47°48.7	-4°23.3	329°35.0	8.8	-22°08.9	-3.1	56.7
16	62°48.9	-4°24.3	344°02.8	8.8	-22°12.0	-3.0	56.6
17	77°49.1	-4°25.3	358°30.5	8.8	-22°14.9	-2.8	56.6
18	92°49.3	-4°26.2	12°58.3	8.8	-22°17.6	-2.7	56.6
19	107°49.5	-4°27.2	27°26.2	8.8	-22°20.3	-2.6	56.5
20	122°49.7	-4°28.2	41°54.0	8.9	-22°22.8	-2.5	56.5
21	137°49.9	-4°29.1	56°21.9	8.9	-22°25.2	-2.3	56.5
22	152°50.1	-4°30.1	70°49.8	8.9	-22°27.5	-2.2	56.4
23	167°50.3	-4°31.1	85°17.7	8.9	-22°29.7	-2.1	56.4
	SD.=16.0	d=-1.0			S.D.=15.6		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°50.4	-4°32.0	99°45.7	9.0	-22°31.7	-2.0	56.3
1	197°50.6	-4°33.0	114°13.7	9.0	-22°33.6	-1.8	56.3
2	212°50.8	-4°33.9	128°41.7	9.0	-22°35.4	-1.7	56.3
3	227°51.0	-4°34.9	143°09.7	9.0	-22°37.0	-1.6	56.2
4	242°51.2	-4°35.9	157°37.8	9.1	-22°38.5	-1.5	56.2
5	257°51.4	-4°36.8	172°05.9	9.1	-22°40.0	-1.3	56.2
6	272°51.6	-4°37.8	186°34.0	9.1	-22°41.2	-1.2	56.1
7	287°51.8	-4°38.8	201°02.1	9.2	-22°42.4	-1.1	56.1
8	302°52.0	-4°39.7	215°30.3	9.2	-22°43.4	-1.0	56.1
9	317°52.2	-4°40.7	229°58.5	9.2	-22°44.3	-0.9	56.0
10	332°52.3	-4°41.6	244°26.8	9.3	-22°45.1	-0.7	56.0
11	347°52.5	-4°42.6	258°55.0	9.3	-22°45.8	-0.6	56.0
12	2°52.7	-4°43.6	273°23.4	9.3	-22°46.3	-0.5	56.0
13	17°52.9	-4°44.5	287°51.7	9.4	-22°46.8	-0.4	55.9
14	32°53.1	-4°45.5	302°20.1	9.4	-22°47.1	-0.2	55.9
15	47°53.3	-4°46.5	316°48.5	9.4	-22°47.2	-0.1	55.9
16	62°53.5	-4°47.4	331°17.0	9.5	-22°47.3	-0.0	55.8
17	77°53.7	-4°48.4	345°45.5	9.5	-22°47.3	0.1	55.8
18	92°53.9	-4°49.3	0°14.0	9.6	-22°47.1	0.2	55.8
19	107°54.0	-4°50.3	14°42.6	9.6	-22°46.8	0.4	55.7
20	122°54.2	-4°51.3	29°11.2	9.6	-22°46.4	0.5	55.7
21	137°54.4	-4°52.2	43°39.8	9.7	-22°45.8	0.6	55.7
22	152°54.6	-4°53.2	58°08.5	9.7	-22°45.2	0.7	55.6
23	167°54.8	-4°54.1	72°37.3	9.8	-22°44.4	0.8	55.6
	SD.=16.0	d=-1.0			S.D.=15.4		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°55.0	-4°55.1	87°06.0	9.8	-22°43.5	0.9	55.6
1	197°55.2	-4°56.1	101°34.8	9.8	-22°42.5	1.1	55.6
2	212°55.3	-4°57.0	116°03.7	9.9	-22°41.4	1.2	55.5
3	227°55.5	-4°58.0	130°32.6	9.9	-22°40.2	1.3	55.5
4	242°55.7	-4°58.9	145°01.5	10.0	-22°38.8	1.4	55.5
5	257°55.9	-4°59.9	159°30.5	10.0	-22°37.3	1.5	55.4
6	272°56.1	-5°00.9	173°59.6	10.1	-22°35.8	1.6	55.4
7	287°56.3	-5°01.8	188°28.6	10.1	-22°34.1	1.7	55.4
8	302°56.5	-5°02.8	202°57.8	10.1	-22°32.3	1.9	55.4
9	317°56.6	-5°03.7	217°26.9	10.2	-22°30.3	2.0	55.3
10	332°56.8	-5°04.7	231°56.2	10.2	-22°28.3	2.1	55.3
11	347°57.0	-5°05.7	246°25.4	10.3	-22°26.2	2.2	55.3
12	2°57.2	-5°06.6	260°54.7	10.3	-22°23.9	2.3	55.3
13	17°57.4	-5°07.6	275°24.1	10.4	-22°21.6	2.4	55.2
14	32°57.6	-5°08.5	289°53.5	10.4	-22°19.1	2.5	55.2
15	47°57.8	-5°09.5	304°23.0	10.5	-22°16.5	2.6	55.2
16	62°57.9	-5°10.5	318°52.5	10.5	-22°13.8	2.7	55.2
17	77°58.1	-5°11.4	333°22.0	10.6	-22°11.0	2.9	55.1
18	92°58.3	-5°12.4	347°51.6	10.6	-22°08.1	3.0	55.1
19	107°58.5	-5°13.3	2°21.3	10.7	-22°05.1	3.1	55.1
20	122°58.7	-5°14.3	16°51.0	10.7	-22°02.0	3.2	55.1
21	137°58.9	-5°15.3	31°20.8	10.8	-21°58.7	3.3	55.0
22	152°59.0	-5°16.2	45°50.6	10.8	-21°55.4	3.4	55.0
23	167°59.2	-5°17.2	60°20.4	10.9	-21°52.0	3.5	55.0
	SD.=16.0	d=-1.0			S.D.=15.2		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:07	05:28	06:35	16:60	18:07	19:26
70	04:17	05:29	06:30	17:05	18:06	19:17
68	04:25	05:30	06:26	17:09	18:05	19:10
66	04:31	05:31	06:22	17:13	18:04	19:04
64	04:36	05:32	06:19	17:16	18:04	18:59
62	04:41	05:32	06:16	17:19	18:03	18:55
60	04:44	05:33	06:14	17:22	18:03	18:51
58	04:47	05:33	06:12	17:24	18:03	18:48
56	04:50	05:33	06:10	17:26	18:03	18:46
54	04:52	05:33	06:08	17:27	18:03	18:44
52	04:54	05:33	06:07	17:29	18:03	18:42
50	04:56	05:33	06:06	17:31	18:03	18:40
45	04:59	05:33	06:02	17:34	18:03	18:37
40	05:01	05:33	05:60	17:37	18:04	18:35
35	05:03	05:32	05:57	17:39	18:04	18:33
30	05:04	05:32	05:55	17:41	18:05	18:33
20	05:04	05:30	05:52	17:45	18:07	18:33
10	05:03	05:27	05:48	17:48	18:09	18:34
0	05:00	05:24	05:45	17:52	18:12	18:37
-10	04:56	05:21	05:42	17:55	18:16	18:41
-20	04:50	05:16	05:38	17:59	18:21	18:47
-30	04:42	05:10	05:34	18:03	18:28	18:56
-35	04:36	05:06	05:32	18:06	18:32	19:02
-40	04:29	05:01	05:29	18:09	18:36	19:09
-45	04:20	04:56	05:25	18:13	18:42	19:18
-50	04:09	04:48	05:21	18:17	18:50	19:29
-52	04:04	04:45	05:19	18:19	18:53	19:35
-54	03:58	04:41	05:17	18:21	18:57	19:41
-56	03:51	04:37	05:15	18:23	19:01	19:48
-58	03:43	04:32	05:13	18:26	19:06	19:56
-60	03:33	04:27	05:10	18:29	19:12	20:06

Lat.		**Moonrise**			**Moonset**	
	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	15:31	16:43	17:15	18:37	19:16	20:30
64	14:50	15:55	16:35	19:19	20:04	21:10
62	14:21	15:24	16:07	19:47	20:34	21:37
60	13:60	15:01	15:46	20:09	20:57	21:59
58	13:42	14:42	15:28	20:27	21:16	22:16
56	13:27	14:27	15:13	20:42	21:32	22:30
54	13:15	14:13	15:01	20:55	21:45	22:43
52	13:03	14:02	14:49	21:06	21:57	22:54
50	12:53	13:51	14:40	21:16	22:07	23:04
45	12:33	13:30	14:19	21:38	22:29	23:24
40	12:16	13:12	14:02	21:55	22:46	23:41
35	12:02	12:57	13:47	22:09	23:01	23:55
30	11:49	12:45	13:35	22:22	23:13	–:–
20	11:28	12:23	13:14	22:43	23:35	–:–
10	11:10	12:04	12:55	23:02	23:54	–:–
0	10:53	11:46	12:38	23:19	–:–	00:12
-10	10:36	11:29	12:21	23:36	–:–	00:29
-20	10:19	11:10	12:02	23:55	–:–	00:48
-30	09:58	10:48	11:41	–:–	00:16	01:09
-35	09:46	10:36	11:29	–:–	00:29	01:22
-40	09:32	10:21	11:14	–:–	00:43	01:36
-45	09:16	10:04	10:57	–:–	01:01	01:54
-50	08:56	09:43	10:36	00:19	01:22	02:15
-52	08:46	09:32	10:26	00:28	01:32	02:25
-54	08:36	09:21	10:15	00:39	01:43	02:37
-56	08:23	09:08	10:02	00:50	01:56	02:50
-58	08:10	08:53	09:47	01:04	02:11	03:05
-60	07:53	08:34	09:29	01:20	02:29	03:23

Day		**Sun**			**Moon**	
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
4	11:03	11:12	11:48	17:06	04:39	6(38%)
5	11:22	11:31	11:48	17:59	05:32	7(48%)
6	11:40	11:49	11:48	18:50	06:24	8(58%)

October 07, 08 ,09 (Mon., Tue., Wed.)

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	15°21.1	169°12.4	-10°02.6	193°18.4	0°09.3	117°14.5	-22°44.3	89°57.5	-22°30.6
1	30°23.6	184°12.0	-10°03.8	208°19.4	0°08.6	132°16.6	-22°44.3	104°59.9	-22°30.6
2	45°26.0	199°11.5	-10°05.0	223°20.4	0°08.0	147°18.6	-22°44.3	120°02.3	-22°30.6
3	60°28.5	214°11.1	-10°06.2	238°21.4	0°07.3	162°20.7	-22°44.4	135°04.6	-22°30.6
4	75°31.0	229°10.6	-10°07.4	253°22.4	0°06.7	177°22.7	-22°44.4	150°07.0	-22°30.6
5	90°33.4	244°10.2	-10°08.6	268°23.4	0°06.0	192°24.8	-22°44.4	165°09.4	-22°30.6
6	105°35.9	259°09.7	-10°09.7	283°24.4	0°05.4	207°26.9	-22°44.5	180°11.8	-22°30.6
7	120°38.4	274°09.3	-10°10.9	298°25.3	0°04.7	222°28.9	-22°44.5	195°14.2	-22°30.6
8	135°40.8	289°08.8	-10°12.1	313°26.3	0°04.1	237°31.0	-22°44.6	210°16.5	-22°30.6
9	150°43.3	304°08.4	-10°13.3	328°27.3	0°03.4	252°33.0	-22°44.6	225°18.9	-22°30.6
10	165°45.7	319°07.9	-10°14.5	343°28.3	0°02.8	267°35.1	-22°44.6	240°21.3	-22°30.6
11	180°48.2	334°07.4	-10°15.7	358°29.3	0°02.1	282°37.2	-22°44.7	255°23.7	-22°30.6
12	195°50.7	349°07.0	-10°16.9	13°30.3	0°01.5	297°39.2	-22°44.7	270°26.1	-22°30.6
13	210°53.1	4°06.5	-10°18.1	28°31.3	0°00.8	312°41.3	-22°44.7	285°28.4	-22°30.6
14	225°55.6	19°06.1	-10°19.2	43°32.3	0°00.2	327°43.3	-22°44.8	300°30.8	-22°30.6
15	240°58.1	34°05.6	-10°20.4	58°33.3	-0°00.5	342°45.4	-22°44.8	315°33.2	-22°30.6
16	256°00.5	49°05.2	-10°21.6	73°34.3	-0°01.1	357°47.4	-22°44.8	330°35.6	-22°30.6
17	271°03.0	64°04.7	-10°22.8	88°35.2	-0°01.8	12°49.5	-22°44.9	345°38.0	-22°30.6
18	286°05.5	79°04.2	-10°24.0	103°36.2	-0°02.4	27°51.5	-22°44.9	0°40.3	-22°30.6
19	301°07.9	94°03.8	-10°25.2	118°37.2	-0°03.1	42°53.6	-22°45.0	15°42.7	-22°30.6
20	316°10.4	109°03.3	-10°26.4	133°38.2	-0°03.7	57°55.7	-22°45.0	30°45.1	-22°30.5
21	331°12.8	124°02.9	-10°27.5	148°39.2	-0°04.4	72°57.7	-22°45.0	45°47.5	-22°30.5
22	346°15.3	139°02.4	-10°28.7	163°40.2	-0°05.0	87°59.8	-22°45.1	60°49.8	-22°30.5
23	1°17.8	154°02.0	-10°29.9	178°41.2	-0°05.7	103°01.8	-22°45.1	75°52.2	-22°30.5
Mer.pass.:22:54		v-0.5 d-1.2 m-3.8		v1.0 d-0.7 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	16°20.2	169°01.5	-10°31.1	193°42.2	-0°06.3	118°03.9	-22°45.1	90°54.6	-22°30.5
1	31°22.7	184°01.0	-10°32.3	208°43.2	-0°07.0	133°05.9	-22°45.2	105°57.0	-22°30.5
2	46°25.2	199°00.6	-10°33.5	223°44.2	-0°07.6	148°08.0	-22°45.2	120°59.4	-22°30.5
3	61°27.6	214°00.1	-10°34.6	238°45.2	-0°08.3	163°10.0	-22°45.2	136°01.7	-22°30.5
4	76°30.1	228°59.6	-10°35.8	253°46.1	-0°08.9	178°12.1	-22°45.3	151°04.1	-22°30.5
5	91°32.6	243°59.2	-10°37.0	268°47.1	-0°09.6	193°14.1	-22°45.3	166°06.5	-22°30.5
6	106°35.0	258°58.7	-10°38.2	283°48.1	-0°10.2	208°16.2	-22°45.4	181°08.9	-22°30.5
7	121°37.5	273°58.3	-10°39.4	298°49.1	-0°10.9	223°18.2	-22°45.4	196°11.2	-22°30.5
8	136°40.0	288°57.8	-10°40.5	313°50.1	-0°11.5	238°20.3	-22°45.4	211°13.6	-22°30.5
9	151°42.4	303°57.3	-10°41.7	328°51.1	-0°12.2	253°22.3	-22°45.5	226°16.0	-22°30.5
10	166°44.9	318°56.9	-10°42.9	343°52.1	-0°12.8	268°24.4	-22°45.5	241°18.4	-22°30.5
11	181°47.3	333°56.4	-10°44.1	358°53.1	-0°13.5	283°26.4	-22°45.5	256°20.7	-22°30.5
12	196°49.8	348°55.9	-10°45.2	13°54.1	-0°14.1	298°28.5	-22°45.6	271°23.1	-22°30.5
13	211°52.3	3°55.5	-10°46.4	28°55.1	-0°14.8	313°30.5	-22°45.6	286°25.5	-22°30.5
14	226°54.7	18°55.0	-10°47.6	43°56.0	-0°15.4	328°32.6	-22°45.6	301°27.9	-22°30.5
15	241°57.2	33°54.5	-10°48.8	58°57.0	-0°16.1	343°34.6	-22°45.7	316°30.2	-22°30.5
16	256°59.7	48°54.1	-10°49.9	73°58.0	-0°16.7	358°36.7	-22°45.7	331°32.6	-22°30.5
17	272°02.1	63°53.6	-10°51.1	88°59.0	-0°17.4	13°38.7	-22°45.8	346°35.0	-22°30.5
18	287°04.6	78°53.1	-10°52.3	104°00.0	-0°18.0	28°40.8	-22°45.8	1°37.4	-22°30.4
19	302°07.1	93°52.7	-10°53.5	119°01.0	-0°18.7	43°42.8	-22°45.8	16°39.7	-22°30.4
20	317°09.5	108°52.2	-10°54.6	134°02.0	-0°19.3	58°44.9	-22°45.9	31°42.1	-22°30.4
21	332°12.0	123°51.7	-10°55.8	149°03.0	-0°20.0	73°46.9	-22°45.9	46°44.5	-22°30.4
22	347°14.5	138°51.3	-10°57.0	164°04.0	-0°20.6	88°49.0	-22°45.9	61°46.9	-22°30.4
23	2°16.9	153°50.8	-10°58.2	179°05.0	-0°21.3	103°51.0	-22°46.0	76°49.2	-22°30.4
Mer.pass.:22:50		v-0.5 d-1.2 m-3.8		v1.0 d-0.7 m1.8		v2.1 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	17°19.4	168°50.3	-10°59.3	194°05.9	-0°21.9	118°53.1	-22°46.0	91°51.6	-22°30.4
1	32°21.8	183°49.9	-11°00.5	209°06.9	-0°22.6	133°55.1	-22°46.1	106°54.0	-22°30.4
2	47°24.3	198°49.4	-11°01.7	224°07.9	-0°23.2	148°57.2	-22°46.1	121°56.3	-22°30.4
3	62°26.8	213°48.9	-11°02.8	239°08.9	-0°23.9	163°59.2	-22°46.1	136°58.7	-22°30.4
4	77°29.2	228°48.5	-11°04.0	254°09.9	-0°24.5	179°01.3	-22°46.2	152°01.1	-22°30.4
5	92°31.7	243°48.0	-11°05.2	269°10.9	-0°25.2	194°03.3	-22°46.2	167°03.5	-22°30.4
6	107°34.2	258°47.5	-11°06.4	284°11.9	-0°25.8	209°05.4	-22°46.2	182°05.8	-22°30.4
7	122°36.6	273°47.0	-11°07.5	299°12.9	-0°26.5	224°07.4	-22°46.3	197°08.2	-22°30.4
8	137°39.1	288°46.6	-11°08.7	314°13.9	-0°27.1	239°09.5	-22°46.3	212°10.6	-22°30.4
9	152°41.6	303°46.1	-11°09.9	329°14.8	-0°27.8	254°11.5	-22°46.3	227°13.0	-22°30.4
10	167°44.0	318°45.6	-11°11.0	344°15.8	-0°28.4	269°13.6	-22°46.4	242°15.3	-22°30.4
11	182°46.5	333°45.2	-11°12.2	359°16.8	-0°29.1	284°15.6	-22°46.4	257°17.7	-22°30.4
12	197°48.9	348°44.7	-11°13.4	14°17.8	-0°29.7	299°17.7	-22°46.5	272°20.1	-22°30.4
13	212°51.4	3°44.2	-11°14.5	29°18.8	-0°30.4	314°19.7	-22°46.5	287°22.4	-22°30.4
14	227°53.9	18°43.7	-11°15.7	44°19.8	-0°31.0	329°21.7	-22°46.5	302°24.8	-22°30.3
15	242°56.3	33°43.3	-11°16.9	59°20.8	-0°31.7	344°23.8	-22°46.6	317°27.2	-22°30.3
16	257°58.8	48°42.8	-11°18.0	74°21.8	-0°32.3	359°25.8	-22°46.6	332°29.5	-22°30.3
17	273°01.3	63°42.3	-11°19.2	89°22.8	-0°33.0	14°27.9	-22°46.6	347°31.9	-22°30.3
18	288°03.7	78°41.8	-11°20.3	104°23.7	-0°33.6	29°29.9	-22°46.7	2°34.3	-22°30.3
19	303°06.2	93°41.4	-11°21.5	119°24.7	-0°34.3	44°32.0	-22°46.7	17°36.7	-22°30.3
20	318°08.7	108°40.9	-11°22.7	134°25.7	-0°34.9	59°34.0	-22°46.7	32°39.0	-22°30.3
21	333°11.1	123°40.4	-11°23.8	149°26.7	-0°35.6	74°36.1	-22°46.8	47°41.4	-22°30.3
22	348°13.6	138°39.9	-11°25.0	164°27.7	-0°36.2	89°38.1	-22°46.8	62°43.8	-22°30.3
23	3°16.1	153°39.4	-11°26.2	179°28.7	-0°36.9	104°40.1	-22°46.9	77°46.1	-22°30.3
Mer.pass.:22:46		v-0.5 d-1.2 m-3.8		v1.0 d-0.7 m1.8		v2.0 d-0.0 m-1.9		v2.4 d0.0 m0.5	

Stars

Star	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.7
Diphda	348°51.1	-17°52.7
Achernar	335°22.9	-57°08.2
Hamal	327°55.6	23°33.3
Polaris	315°29.8	89°20.6
Akamar	315°14.7	-40°13.5
Menkar	314°10.3	4°10.0
Mirfak	308°33.8	49°55.7
Aldebaran	290°44.2	16°32.9
Rigel	281°07.8	-8°10.7
Capella	280°27.9	46°00.9
Bellatrix	278°27.2	6°22.0
Elnath	278°07.0	28°37.3
Alnilam	275°41.9	-1°11.3
Betelgeuse	270°56.5	7°24.6
Canopus	263°54.1	-52°42.1
Sirius	258°29.8	-16°44.3
Adara	255°09.1	-28°59.7
Procyon	244°55.2	5°10.7
Pollux	243°22.4	27°58.6
Avior	234°16.5	-59°34.0
Suhail	222°49.5	-43°30.4
Miaplacidus	221°39.4	-69°47.6
Alphard	217°52.0	-8°44.5
Regulus	207°39.1	11°52.4
Dubhe	193°46.9	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.8
Acrux	173°05.2	-63°12.3
Gacrux	171°56.7	-57°13.2
Alioth	166°17.5	55°51.3
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.1
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.4
Rigil Kent.	139°46.5	-60°54.9
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.1	74°04.7
Alphecca	126°07.6	26°39.3
Antares	112°21.2	-26°28.4
Atria	107°19.4	-69°03.8
Sabik	102°07.8	-15°44.8
Shaula	96°16.2	-37°07.0
Rasalhague	96°02.6	12°33.1
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.2	-34°22.4
Vega	80°36.1	38°48.5
Nunki	75°53.0	-26°16.3
Altair	62°04.1	8°55.4
Peacock	53°12.2	-56°40.4
Deneb	49°28.4	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°48.9	28°11.5
Markab	13°33.8	15°18.8

2019/10/	SHA	Mer.pass
Venus	153°51.3	12:44
Mars	177°57.3	11:06
Jupiter	101°53.4	16:09
Saturn	74°36.4	17:57

2019/10/	SHA	Mer.pass
Venus	152°41.2	12:44
Mars	177°21.9	11:04
Jupiter	101°43.6	16:06
Saturn	74°34.4	17:54

2019/10/	SHA	Mer.pass
Venus	151°31.0	12:45
Mars	176°46.6	11:03
Jupiter	101°33.7	16:02
Saturn	74°32.2	17:50

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°59.4	-5°18.1	74°50.4	10.9	-21°48.4	3.6	55.0
1	197°59.6	-5°19.1	89°20.3	11.0	-21°44.8	3.7	55.0
2	212°59.8	-5°20.0	103°50.3	11.0	-21°41.0	3.8	54.9
3	227°60.0	-5°21.0	118°20.4	11.1	-21°37.2	3.9	54.9
4	243°00.1	-5°22.0	132°50.5	11.2	-21°33.2	4.0	54.9
5	258°00.3	-5°22.9	147°20.7	11.2	-21°29.2	4.1	54.9
6	273°00.5	-5°23.9	161°50.9	11.3	-21°25.0	4.2	54.8
7	288°00.7	-5°24.8	176°21.2	11.3	-21°20.8	4.3	54.8
8	303°00.9	-5°25.8	190°51.6	11.4	-21°16.4	4.4	54.8
9	318°01.1	-5°26.7	205°22.0	11.4	-21°12.0	4.5	54.8
10	333°01.2	-5°27.7	219°52.4	11.5	-21°07.4	4.6	54.8
11	348°01.4	-5°28.7	234°22.9	11.5	-21°02.8	4.7	54.7
12	3°01.6	-5°29.6	248°53.5	11.6	-20°58.0	4.8	54.7
13	18°01.8	-5°30.6	263°24.1	11.6	-20°53.2	4.9	54.7
14	33°02.0	-5°31.5	277°54.7	11.7	-20°48.3	5.0	54.7
15	48°02.1	-5°32.5	292°25.4	11.7	-20°43.2	5.1	54.7
16	63°02.3	-5°33.4	306°56.2	11.8	-20°38.1	5.2	54.7
17	78°02.5	-5°34.4	321°27.0	11.9	-20°32.9	5.3	54.6
18	93°02.7	-5°35.3	335°57.9	11.9	-20°27.6	5.4	54.6
19	108°02.9	-5°36.3	350°28.9	12.0	-20°22.2	5.4	54.6
20	123°03.0	-5°37.3	4°59.9	12.0	-20°16.7	5.5	54.6
21	138°03.2	-5°38.2	19°30.9	12.1	-20°11.1	5.6	54.6
22	153°03.4	-5°39.2	34°02.0	12.1	-20°05.5	5.7	54.6
23	168°03.6	-5°40.1	48°33.2	12.2	-19°59.7	5.8	54.5
	SD.=16.0	d=-1.0			S.D.=15.0		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°03.8	-5°41.1	63°04.4	12.2	-19°53.9	5.9	54.5
1	198°03.9	-5°42.0	77°35.6	12.3	-19°47.9	6.0	54.5
2	213°04.1	-5°43.0	92°07.0	12.3	-19°41.9	6.1	54.5
3	228°04.3	-5°43.9	106°38.3	12.4	-19°35.8	6.2	54.5
4	243°04.5	-5°44.9	121°09.8	12.5	-19°29.6	6.2	54.5
5	258°04.6	-5°45.8	135°41.3	12.5	-19°23.3	6.3	54.4
6	273°04.8	-5°46.8	150°12.8	12.6	-19°16.9	6.4	54.4
7	288°05.0	-5°47.8	164°44.4	12.6	-19°10.5	6.5	54.4
8	303°05.2	-5°48.7	179°16.0	12.7	-19°03.9	6.6	54.4
9	318°05.4	-5°49.7	193°47.7	12.7	-18°57.3	6.7	54.4
10	333°05.5	-5°50.6	208°19.5	12.8	-18°50.6	6.7	54.4
11	348°05.7	-5°51.6	222°51.3	12.8	-18°43.9	6.8	54.4
12	3°05.9	-5°52.5	237°23.2	12.9	-18°37.0	6.9	54.3
13	18°06.1	-5°53.5	251°55.1	12.9	-18°30.1	7.0	54.3
14	33°06.2	-5°54.4	266°27.0	13.0	-18°23.0	7.1	54.3
15	48°06.4	-5°55.4	280°59.1	13.0	-18°15.9	7.1	54.3
16	63°06.6	-5°56.3	295°31.1	13.1	-18°08.8	7.2	54.3
17	78°06.8	-5°57.3	310°03.3	13.2	-18°01.5	7.3	54.3
18	93°06.9	-5°58.2	324°35.4	13.2	-17°54.2	7.4	54.3
19	108°07.1	-5°59.2	339°07.7	13.3	-17°46.8	7.4	54.3
20	123°07.3	-6°00.1	353°40.0	13.3	-17°39.3	7.5	54.3
21	138°07.5	-6°01.1	8°12.3	13.4	-17°31.7	7.6	54.2
22	153°07.6	-6°02.0	22°44.7	13.4	-17°24.1	7.7	54.2
23	168°07.8	-6°03.0	37°17.1	13.5	-17°16.4	7.7	54.2
	SD.=16.0	d=-1.0			S.D.=14.9		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°08.0	-6°04.0	51°49.6	13.5	-17°08.6	7.8	54.2
1	198°08.2	-6°04.9	66°22.1	13.6	-17°00.8	7.9	54.2
2	213°08.3	-6°05.9	80°54.7	13.6	-16°52.9	8.0	54.2
3	228°08.5	-6°06.8	95°27.3	13.7	-16°44.9	8.0	54.2
4	243°08.7	-6°07.8	110°00.0	13.7	-16°36.8	8.1	54.2
5	258°08.9	-6°08.7	124°32.8	13.8	-16°28.7	8.2	54.2
6	273°09.0	-6°09.7	139°05.5	13.8	-16°20.5	8.2	54.2
7	288°09.2	-6°10.6	153°38.4	13.9	-16°12.3	8.3	54.2
8	303°09.4	-6°11.6	168°11.2	13.9	-16°03.9	8.4	54.1
9	318°09.6	-6°12.5	182°44.2	13.9	-15°55.5	8.4	54.1
10	333°09.7	-6°13.5	197°17.1	14.0	-15°47.1	8.5	54.1
11	348°09.9	-6°14.4	211°50.2	14.0	-15°38.6	8.6	54.1
12	3°10.1	-6°15.4	226°23.2	14.1	-15°30.0	8.6	54.1
13	18°10.2	-6°16.3	240°56.3	14.1	-15°21.3	8.7	54.1
14	33°10.4	-6°17.3	255°29.5	14.2	-15°12.6	8.7	54.1
15	48°10.6	-6°18.2	270°02.7	14.2	-15°03.8	8.8	54.1
16	63°10.8	-6°19.2	284°35.9	14.3	-14°55.0	8.9	54.1
17	78°10.9	-6°20.1	299°09.2	14.3	-14°46.1	8.9	54.1
18	93°11.1	-6°21.1	313°42.5	14.4	-14°37.1	9.0	54.1
19	108°11.3	-6°22.0	328°15.9	14.4	-14°28.1	9.0	54.1
20	123°11.4	-6°23.0	342°49.3	14.4	-14°19.0	9.1	54.1
21	138°11.6	-6°23.9	357°22.8	14.5	-14°09.9	9.2	54.1
22	153°11.8	-6°24.9	11°56.3	14.5	-14°00.7	9.2	54.1
23	168°12.0	-6°25.8	26°29.8	14.6	-13°51.5	9.3	54.1
	SD.=16.0	d=-1.0			S.D.=14.8		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:22	05:41	06:49	16:44	17:52	19:10
70	04:30	05:41	06:42	16:51	17:52	19:03
68	04:36	05:41	06:37	16:57	17:53	18:57
66	04:41	05:41	06:32	17:02	17:53	18:52
64	04:45	05:40	06:28	17:06	17:53	18:48
62	04:49	05:40	06:24	17:10	17:54	18:45
60	04:51	05:40	06:21	17:13	17:54	18:42
58	04:54	05:39	06:19	17:15	17:55	18:40
56	04:56	05:39	06:16	17:18	17:55	18:38
54	04:58	05:39	06:14	17:20	17:56	18:36
52	04:59	05:38	06:12	17:22	17:56	18:35
50	05:00	05:38	06:10	17:24	17:56	18:34
45	05:03	05:37	06:06	17:28	17:58	18:32
40	05:04	05:36	06:03	17:32	17:59	18:30
35	05:05	05:35	05:60	17:35	18:00	18:29
30	05:06	05:33	05:57	17:38	18:02	18:29
20	05:05	05:30	05:53	17:42	18:04	18:30
10	05:03	05:27	05:48	17:47	18:08	18:32
0	04:59	05:24	05:44	17:51	18:12	18:36
-10	04:55	05:19	05:40	17:55	18:16	18:41
-20	04:48	05:14	05:36	17:60	18:22	18:48
-30	04:38	05:06	05:30	18:05	18:29	18:58
-35	04:32	05:02	05:27	18:08	18:34	19:04
-40	04:24	04:56	05:24	18:12	18:40	19:12
-45	04:14	04:50	05:20	18:16	18:46	19:22
-50	04:02	04:42	05:15	18:21	18:55	19:35
-52	03:56	04:38	05:12	18:24	18:59	19:41
-54	03:49	04:34	05:10	18:26	19:03	19:48
-56	03:42	04:29	05:07	18:29	19:08	19:55
-58	03:33	04:23	05:04	18:33	19:13	20:04
-60	03:23	04:17	05:01	18:36	19:20	20:15

Lat.	Moonrise			Moonset		
	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	19:47	18:40	–:–	21:19	23:59
70	–:–	18:33	18:10	–:–	22:32	–:–
68	18:09	17:56	17:47	21:19	23:09	–:–
66	17:25	17:29	17:30	22:01	23:34	–:–
64	16:56	17:08	17:15	22:30	23:54	–:–
62	16:34	16:52	17:03	22:51	–:–	00:10
60	16:16	16:38	16:53	23:09	–:–	00:24
58	16:01	16:26	16:44	23:24	–:–	00:35
56	15:49	16:15	16:36	23:36	–:–	00:45
54	15:37	16:06	16:29	23:47	–:–	00:54
52	15:28	15:58	16:22	23:56	–:–	01:02
50	15:19	15:50	16:17	–:–	00:05	01:09
45	14:60	15:34	16:04	–:–	00:23	01:24
40	14:44	15:21	15:54	–:–	00:38	01:36
35	14:31	15:10	15:45	–:–	00:50	01:46
30	14:20	15:00	15:37	00:07	01:01	01:55
20	14:01	14:44	15:23	00:28	01:20	02:11
10	13:44	14:29	15:11	00:46	01:36	02:24
0	13:28	14:15	15:00	01:02	01:51	02:37
-10	13:12	14:01	14:49	01:19	02:06	02:50
-20	12:55	13:46	14:37	01:37	02:22	03:03
-30	12:35	13:29	14:23	01:57	02:40	03:18
-35	12:24	13:19	14:15	02:09	02:50	03:27
-40	12:10	13:08	14:06	02:23	03:02	03:37
-45	11:55	12:54	13:55	02:39	03:17	03:49
-50	11:35	12:38	13:42	02:59	03:34	04:03
-52	11:26	12:30	13:36	03:08	03:42	04:09
-54	11:16	12:22	13:29	03:18	03:51	04:17
-56	11:04	12:12	13:22	03:30	04:01	04:25
-58	10:51	12:01	13:13	03:44	04:13	04:34
-60	10:35	11:48	13:04	04:00	04:26	04:44

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
7	11:58	12:06	11:47	19:39	07:15	9(67%)
8	12:15	12:23	11:47	20:26	08:03	10(76%)
9	12:32	12:40	11:47	21:10	08:48	11(84%)

October 10, 11 ,12 (Thu., Fri., Sat.)

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	18°18.5	168°39.0	-11°27.3	194°29.7	-0°37.5	119°42.2	-22°46.9	92°48.5	-22°30.3
1	33°21.0	183°38.5	-11°28.5	209°30.7	-0°38.2	134°44.2	-22°46.9	107°50.9	-22°30.3
2	48°23.4	198°38.0	-11°29.6	224°31.7	-0°38.8	149°46.3	-22°47.0	122°53.2	-22°30.3
3	63°25.9	213°37.5	-11°30.8	239°32.6	-0°39.5	164°48.3	-22°47.0	137°55.6	-22°30.3
4	78°28.4	228°37.1	-11°32.0	254°33.6	-0°40.1	179°50.4	-22°47.0	152°58.0	-22°30.3
5	93°30.8	243°36.6	-11°33.1	269°34.6	-0°40.8	194°52.4	-22°47.1	168°00.3	-22°30.3
6	108°33.3	258°36.1	-11°34.3	284°35.6	-0°41.4	209°54.4	-22°47.1	183°02.7	-22°30.3
7	123°35.8	273°35.6	-11°35.4	299°36.6	-0°42.1	224°56.5	-22°47.1	198°05.1	-22°30.3
8	138°38.2	288°35.1	-11°36.6	314°37.6	-0°42.7	239°58.5	-22°47.2	213°07.5	-22°30.2
9	153°40.7	303°34.6	-11°37.7	329°38.6	-0°43.4	255°00.6	-22°47.2	228°09.8	-22°30.2
10	168°43.2	318°34.2	-11°38.9	344°39.6	-0°44.0	270°02.6	-22°47.3	243°12.2	-22°30.2
11	183°45.6	333°33.7	-11°40.1	359°40.6	-0°44.7	285°04.7	-22°47.3	258°14.6	-22°30.2
12	198°48.1	348°33.2	-11°41.2	14°41.5	-0°45.3	300°06.7	-22°47.3	273°16.9	-22°30.2
13	213°50.5	3°32.7	-11°42.4	29°42.5	-0°46.0	315°08.7	-22°47.4	288°19.3	-22°30.2
14	228°53.0	18°32.2	-11°43.5	44°43.5	-0°46.6	330°10.8	-22°47.4	303°21.7	-22°30.2
15	243°55.5	33°31.8	-11°44.7	59°44.5	-0°47.3	345°12.8	-22°47.4	318°24.0	-22°30.2
16	258°57.9	48°31.3	-11°45.8	74°45.5	-0°47.9	0°14.9	-22°47.5	333°26.4	-22°30.2
17	274°00.4	63°30.8	-11°47.0	89°46.5	-0°48.6	15°16.9	-22°47.5	348°28.8	-22°30.2
18	289°02.9	78°30.3	-11°48.1	104°47.5	-0°49.2	30°18.9	-22°47.5	3°31.1	-22°30.2
19	304°05.3	93°29.8	-11°49.3	119°48.5	-0°49.9	45°21.0	-22°47.6	18°33.5	-22°30.2
20	319°07.8	108°29.3	-11°50.4	134°49.4	-0°50.5	60°23.0	-22°47.6	33°35.8	-22°30.2
21	334°10.3	123°28.8	-11°51.6	149°50.4	-0°51.2	75°25.0	-22°47.7	48°38.2	-22°30.2
22	349°12.7	138°28.4	-11°52.7	164°51.4	-0°51.8	90°27.1	-22°47.7	63°40.6	-22°30.2
23	4°15.2	153°27.9	-11°53.9	179°52.4	-0°52.5	105°29.1	-22°47.7	78°42.9	-22°30.2
Mer.pass.:22:43		v-0.5 d-1.2 m-3.8		v1.0 d-0.7 m1.8		v2.0 d-0.0 m-1.8		v2.4 d0.0 m0.5	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	19°17.7	168°27.4	-11°55.0	194°53.4	-0°53.1	120°31.2	-22°47.8	93°45.3	-22°30.2
1	34°20.1	183°26.9	-11°56.2	209°54.4	-0°53.8	135°33.2	-22°47.8	108°47.7	-22°30.2
2	49°22.6	198°26.4	-11°57.3	224°55.4	-0°54.5	150°35.2	-22°47.8	123°50.0	-22°30.1
3	64°25.0	213°25.9	-11°58.5	239°56.4	-0°55.1	165°37.3	-22°47.9	138°52.4	-22°30.1
4	79°27.5	228°25.4	-11°59.6	254°57.4	-0°55.8	180°39.3	-22°47.9	153°54.8	-22°30.1
5	94°30.0	243°24.9	-12°00.8	269°58.3	-0°56.4	195°41.3	-22°47.9	168°57.1	-22°30.1
6	109°32.4	258°24.4	-12°01.9	284°59.3	-0°57.1	210°43.4	-22°48.0	183°59.5	-22°30.1
7	124°34.9	273°24.0	-12°03.1	300°00.3	-0°57.7	225°45.4	-22°48.0	199°01.9	-22°30.1
8	139°37.4	288°23.5	-12°04.2	315°01.3	-0°58.4	240°47.5	-22°48.0	214°04.2	-22°30.1
9	154°39.8	303°23.0	-12°05.4	330°02.3	-0°59.0	255°49.5	-22°48.1	229°06.6	-22°30.1
10	169°42.3	318°22.5	-12°06.5	345°03.3	-0°59.7	270°51.5	-22°48.1	244°08.9	-22°30.1
11	184°44.8	333°22.0	-12°07.7	0°04.3	-1°00.3	285°53.6	-22°48.2	259°11.3	-22°30.1
12	199°47.2	348°21.5	-12°08.8	15°05.3	-1°01.0	300°55.6	-22°48.2	274°13.7	-22°30.1
13	214°49.7	3°21.0	-12°09.9	30°06.2	-1°01.6	315°57.6	-22°48.2	289°16.0	-22°30.1
14	229°52.2	18°20.5	-12°11.1	45°07.2	-1°02.3	330°59.7	-22°48.3	304°18.4	-22°30.1
15	244°54.6	33°20.0	-12°12.2	60°08.2	-1°02.9	346°01.7	-22°48.3	319°20.8	-22°30.1
16	259°57.1	48°19.5	-12°13.4	75°09.2	-1°03.6	1°03.7	-22°48.3	334°23.1	-22°30.1
17	274°59.5	63°19.0	-12°14.5	90°10.2	-1°04.2	16°05.8	-22°48.4	349°25.5	-22°30.1
18	290°02.0	78°18.5	-12°15.7	105°11.2	-1°04.9	31°07.8	-22°48.4	4°27.8	-22°30.0
19	305°04.5	93°18.0	-12°16.8	120°12.2	-1°05.5	46°09.8	-22°48.4	19°30.2	-22°30.0
20	320°06.9	108°17.5	-12°17.9	135°13.2	-1°06.2	61°11.9	-22°48.5	34°32.6	-22°30.0
21	335°09.4	123°17.0	-12°19.1	150°14.1	-1°06.8	76°13.9	-22°48.5	49°34.9	-22°30.0
22	350°11.9	138°16.5	-12°20.2	165°15.1	-1°07.5	91°15.9	-22°48.6	64°37.3	-22°30.0
23	5°14.3	153°16.0	-12°21.4	180°16.1	-1°08.1	106°18.0	-22°48.6	79°39.6	-22°30.0
Mer.pass.:22:39		v-0.5 d-1.1 m-3.8		v1.0 d-0.7 m1.8		v2.0 d-0.0 m-1.8		v2.4 d0.0 m0.5	

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	20°16.8	168°15.6	-12°22.5	195°17.1	-1°08.8	121°20.0	-22°48.6	94°42.0	-22°30.0
1	35°19.3	183°15.1	-12°23.6	210°18.1	-1°09.4	136°22.0	-22°48.7	109°44.4	-22°30.0
2	50°21.7	198°14.6	-12°24.8	225°19.1	-1°10.1	151°24.1	-22°48.7	124°46.7	-22°30.0
3	65°24.2	213°14.1	-12°25.9	240°20.1	-1°10.7	166°26.1	-22°48.7	139°49.1	-22°30.0
4	80°26.6	228°13.6	-12°27.0	255°21.0	-1°11.4	181°28.1	-22°48.8	154°51.4	-22°30.0
5	95°29.1	243°13.1	-12°28.2	270°22.0	-1°12.0	196°30.2	-22°48.8	169°53.8	-22°30.0
6	110°31.6	258°12.6	-12°29.3	285°23.0	-1°12.7	211°32.2	-22°48.8	184°56.2	-22°30.0
7	125°34.0	273°12.1	-12°30.4	300°24.0	-1°13.3	226°34.2	-22°48.9	199°58.5	-22°30.0
8	140°36.5	288°11.6	-12°31.6	315°25.0	-1°14.0	241°36.3	-22°48.9	215°00.9	-22°30.0
9	155°39.0	303°11.1	-12°32.7	330°26.0	-1°14.6	256°38.3	-22°49.0	230°03.2	-22°30.0
10	170°41.4	318°10.6	-12°33.8	345°27.0	-1°15.3	271°40.3	-22°49.0	245°05.6	-22°29.9
11	185°43.9	333°10.0	-12°35.0	0°28.0	-1°15.9	286°42.4	-22°49.0	260°08.0	-22°29.9
12	200°46.4	348°09.5	-12°36.1	15°28.9	-1°16.6	301°44.4	-22°49.1	275°10.3	-22°29.9
13	215°48.8	3°09.0	-12°37.2	30°29.9	-1°17.2	316°46.4	-22°49.1	290°12.7	-22°29.9
14	230°51.3	18°08.5	-12°38.4	45°30.9	-1°17.9	331°48.4	-22°49.1	305°15.0	-22°29.9
15	245°53.8	33°08.0	-12°39.5	60°31.9	-1°18.5	346°50.5	-22°49.2	320°17.4	-22°29.9
16	260°56.2	48°07.5	-12°40.6	75°32.9	-1°19.2	1°52.5	-22°49.2	335°19.8	-22°29.9
17	275°58.7	63°07.0	-12°41.8	90°33.9	-1°19.8	16°54.5	-22°49.2	350°22.1	-22°29.9
18	291°01.1	78°06.5	-12°42.9	105°34.9	-1°20.5	31°56.6	-22°49.3	5°24.5	-22°29.9
19	306°03.6	93°06.0	-12°44.0	120°35.8	-1°21.1	46°58.6	-22°49.3	20°26.8	-22°29.9
20	321°06.1	108°05.5	-12°45.1	135°36.8	-1°21.8	62°00.6	-22°49.3	35°29.2	-22°29.9
21	336°08.5	123°05.0	-12°46.3	150°37.8	-1°22.4	77°02.7	-22°49.4	50°31.5	-22°29.9
22	351°11.0	138°04.5	-12°47.4	165°38.8	-1°23.1	92°04.7	-22°49.4	65°33.9	-22°29.9
23	6°13.5	153°04.0	-12°48.5	180°39.8	-1°23.7	107°06.7	-22°49.5	80°36.3	-22°29.9
Mer.pass.:22:35		v-0.5 d-1.1 m-3.8		v1.0 d-0.7 m1.8		v2.0 d-0.0 m-1.8		v2.4 d0.0 m0.5	

Stars

Star	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.7
Diphda	348°51.1	-17°52.7
Achernar	335°22.9	-57°08.2
Hamal	327°55.6	23°33.3
Polaris	315°29.1	89°20.6
Akamar	315°14.7	-40°13.5
Menkar	314°10.2	4°10.0
Mirfak	308°33.8	49°55.7
Aldebaran	290°44.2	16°32.9
Rigel	281°07.7	-8°10.7
Capella	280°27.9	46°00.9
Bellatrix	278°27.2	6°22.0
Elnath	278°07.0	28°37.3
Alnilam	275°41.9	-1°11.3
Betelgeuse	270°56.5	7°24.6
Canopus	263°54.1	-52°42.1
Sirius	258°29.8	-16°44.3
Adara	255°09.1	-28°59.7
Procyon	244°55.2	5°10.7
Pollux	243°22.4	27°58.6
Avior	234°16.5	-59°34.0
Suhail	222°49.5	-43°30.4
Miaplacidus	221°39.3	-69°47.5
Alphard	217°52.0	-8°44.5
Regulus	207°39.1	11°52.4
Dubhe	193°46.9	61°38.7
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.8
Acrux	173°05.2	-63°12.3
Gacrux	171°56.7	-57°13.2
Alioth	166°17.5	55°51.3
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.1
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.4
Rigil Kent.	139°46.5	-60°54.9
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.1	74°04.7
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.5	-69°03.8
Sabik	102°07.8	-15°44.8
Shaula	96°16.2	-37°07.0
Rasalhague	96°02.6	12°33.1
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.2	-34°22.5
Vega	80°36.2	38°48.4
Nunki	75°53.0	-26°16.3
Altair	62°04.1	8°55.4
Peacock	53°12.3	-56°40.4
Deneb	49°28.4	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	SHA	Mer.pass
Venus	150°20.5	12:46
Mars	176°11.2	11:01
Jupiter	101°23.7	15:59
Saturn	74°30.0	17:46

2019/10/	SHA	Mer.pass
Venus	149°09.7	12:47
Mars	175°35.7	10:60
Jupiter	101°13.5	15:56
Saturn	74°27.7	17:42

2019/10/	SHA	Mer.pass
Venus	147°58.8	12:47
Mars	175°00.3	10:58
Jupiter	101°03.2	15:53
Saturn	74°25.2	17:38

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°12.1	-6°26.7	41°03.4	14.6	-13°42.1	9.3	54.1
1	198°12.3	-6°27.7	55°37.0	14.6	-13°32.8	9.4	54.1
2	213°12.5	-6°28.6	70°10.7	14.7	-13°23.4	9.4	54.0
3	228°12.6	-6°29.6	84°44.4	14.7	-13°13.9	9.5	54.0
4	243°12.8	-6°30.5	99°18.1	14.8	-13°04.4	9.6	54.0
5	258°13.0	-6°31.5	113°51.9	14.8	-12°54.8	9.6	54.0
6	273°13.1	-6°32.4	128°25.7	14.8	-12°45.2	9.7	54.0
7	288°13.3	-6°33.4	142°59.6	14.9	-12°35.5	9.7	54.0
8	303°13.5	-6°34.3	157°33.4	14.9	-12°25.7	9.8	54.0
9	318°13.7	-6°35.3	172°07.4	14.9	-12°16.0	9.8	54.0
10	333°13.8	-6°36.2	186°41.3	15.0	-12°06.1	9.9	54.0
11	348°14.0	-6°37.2	201°15.3	15.0	-11°56.2	9.9	54.0
12	3°14.2	-6°38.1	215°49.3	15.0	-11°46.3	10.0	54.0
13	18°14.3	-6°39.1	230°23.4	15.1	-11°36.3	10.0	54.0
14	33°14.5	-6°40.0	244°57.5	15.1	-11°26.3	10.0	54.0
15	48°14.7	-6°41.0	259°31.6	15.1	-11°16.2	10.1	54.0
16	63°14.8	-6°41.9	274°05.8	15.2	-11°06.1	10.1	54.0
17	78°15.0	-6°42.8	288°39.9	15.2	-10°56.0	10.2	54.0
18	93°15.2	-6°43.8	303°14.2	15.2	-10°45.7	10.2	54.0
19	108°15.3	-6°44.7	317°48.4	15.3	-10°35.5	10.3	54.0
20	123°15.5	-6°45.7	332°22.7	15.3	-10°25.2	10.3	54.0
21	138°15.7	-6°46.6	346°57.0	15.3	-10°14.9	10.4	54.0
22	153°15.8	-6°47.6	1°31.3	15.3	-10°04.5	10.4	54.0
23	168°16.0	-6°48.5	16°05.7	15.4	-9°54.1	10.4	54.0
	SD.=16.0	d=-0.9			S.D.=14.7		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°16.2	-6°49.5	30°40.1	15.4	-9°43.6	10.5	54.0
1	198°16.3	-6°50.4	45°14.5	15.4	-9°33.1	10.5	54.0
2	213°16.5	-6°51.3	59°48.9	15.4	-9°22.6	10.6	54.0
3	228°16.6	-6°52.3	74°23.4	15.5	-9°12.0	10.6	54.0
4	243°16.8	-6°53.2	88°57.8	15.5	-9°01.4	10.6	54.0
5	258°17.0	-6°54.2	103°32.4	15.5	-8°50.7	10.7	54.0
6	273°17.1	-6°55.1	118°06.9	15.5	-8°40.0	10.7	54.0
7	288°17.3	-6°56.1	132°41.4	15.6	-8°29.3	10.7	54.0
8	303°17.5	-6°57.0	147°16.0	15.6	-8°18.6	10.8	54.0
9	318°17.6	-6°57.9	161°50.6	15.6	-8°07.8	10.8	54.0
10	333°17.8	-6°58.9	176°25.2	15.6	-7°56.9	10.8	54.0
11	348°18.0	-6°59.8	190°59.9	15.6	-7°46.1	10.9	54.0
12	3°18.1	-7°00.8	205°34.5	15.7	-7°35.2	10.9	54.0
13	18°18.3	-7°01.7	220°09.2	15.7	-7°24.3	10.9	54.1
14	33°18.4	-7°02.7	234°43.9	15.7	-7°13.3	11.0	54.1
15	48°18.6	-7°03.6	249°18.6	15.7	-7°02.3	11.0	54.1
16	63°18.8	-7°04.5	263°53.3	15.7	-6°51.3	11.0	54.1
17	78°18.9	-7°05.5	278°28.1	15.7	-6°40.3	11.1	54.1
18	93°19.1	-7°06.4	293°02.8	15.8	-6°29.2	11.1	54.1
19	108°19.3	-7°07.4	307°37.6	15.8	-6°18.1	11.1	54.1
20	123°19.4	-7°08.3	322°12.4	15.8	-6°07.0	11.1	54.1
21	138°19.6	-7°09.3	336°47.2	15.8	-5°55.8	11.2	54.1
22	153°19.7	-7°10.2	351°22.0	15.8	-5°44.6	11.2	54.1
23	168°19.9	-7°11.1	5°56.8	15.8	-5°33.4	11.2	54.1
	SD.=16.0	d=-0.9			S.D.=14.7		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°20.1	-7°12.1	20°31.6	15.8	-5°22.2	11.2	54.1
1	198°20.2	-7°13.0	35°06.5	15.8	-5°10.9	11.3	54.1
2	213°20.4	-7°14.0	49°41.3	15.9	-4°59.6	11.3	54.1
3	228°20.5	-7°14.9	64°16.2	15.9	-4°48.3	11.3	54.1
4	243°20.7	-7°15.8	78°51.1	15.9	-4°37.0	11.3	54.1
5	258°20.9	-7°16.8	93°25.9	15.9	-4°25.7	11.4	54.1
6	273°21.0	-7°17.7	108°00.8	15.9	-4°14.3	11.4	54.1
7	288°21.2	-7°18.7	122°35.7	15.9	-4°02.9	11.4	54.1
8	303°21.3	-7°19.6	137°10.6	15.9	-3°51.5	11.4	54.1
9	318°21.5	-7°20.5	151°45.5	15.9	-3°40.1	11.4	54.2
10	333°21.7	-7°21.5	166°20.4	15.9	-3°28.6	11.5	54.2
11	348°21.8	-7°22.4	180°55.3	15.9	-3°17.2	11.5	54.2
12	3°22.0	-7°23.3	195°30.2	15.9	-3°05.7	11.5	54.2
13	18°22.1	-7°24.3	210°05.1	15.9	-2°54.2	11.5	54.2
14	33°22.3	-7°25.2	224°40.0	15.9	-2°42.7	11.5	54.2
15	48°22.4	-7°26.2	239°14.9	15.9	-2°31.2	11.5	54.2
16	63°22.6	-7°27.1	253°49.8	15.9	-2°19.7	11.5	54.2
17	78°22.8	-7°28.0	268°24.7	15.9	-2°08.1	11.6	54.2
18	93°22.9	-7°29.0	282°59.6	15.9	-1°56.5	11.6	54.2
19	108°23.1	-7°29.9	297°34.5	15.9	-1°45.0	11.6	54.2
20	123°23.2	-7°30.8	312°09.4	15.9	-1°33.4	11.6	54.2
21	138°23.4	-7°31.8	326°44.3	15.9	-1°21.8	11.6	54.2
22	153°23.5	-7°32.7	341°19.2	15.9	-1°10.2	11.6	54.3
23	168°23.7	-7°33.7	355°54.1	15.9	-0°58.6	11.6	54.3
	SD.=16.0	d=-0.9			S.D.=14.8		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:36	05:54	07:03	16:28	17:37	18:55
70	04:42	05:53	06:55	16:37	17:39	18:49
68	04:47	05:51	06:48	16:44	17:40	18:45
66	04:51	05:50	06:42	16:50	17:42	18:41
64	04:54	05:49	06:37	16:56	17:43	18:38
62	04:56	05:48	06:32	16:60	17:44	18:36
60	04:59	05:47	06:29	17:04	17:46	18:34
58	05:00	05:46	06:25	17:07	17:47	18:32
56	05:02	05:45	06:22	17:10	17:48	18:30
54	05:03	05:44	06:20	17:13	17:48	18:29
52	05:04	05:43	06:17	17:16	17:49	18:28
50	05:05	05:42	06:15	17:18	17:50	18:28
45	05:07	05:41	06:10	17:23	17:52	18:26
40	05:07	05:39	06:06	17:27	17:54	18:26
35	05:08	05:37	06:02	17:31	17:56	18:25
30	05:07	05:35	05:59	17:34	17:58	18:26
20	05:06	05:31	05:53	17:40	18:02	18:28
10	05:03	05:27	05:48	17:45	18:06	18:31
0	04:59	05:23	05:44	17:50	18:11	18:35
-10	04:53	05:17	05:39	17:55	18:16	18:41
-20	04:45	05:11	05:33	18:01	18:23	18:49
-30	04:34	05:03	05:27	18:07	18:31	18:60
-35	04:27	04:58	05:23	18:11	18:37	19:07
-40	04:19	04:52	05:19	18:15	18:43	19:16
-45	04:08	04:44	05:14	18:20	18:50	19:26
-50	03:55	04:35	05:08	18:26	18:60	19:40
-52	03:48	04:31	05:06	18:29	19:04	19:47
-54	03:41	04:26	05:03	18:32	19:09	19:54
-56	03:33	04:21	04:59	18:36	19:14	20:03
-58	03:23	04:15	04:56	18:39	19:21	20:13
-60	03:11	04:08	04:52	18:44	19:28	20:25

	Moonrise			Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	18:11	17:51	17:33	–:–	01:57	03:45
70	17:54	17:42	17:31	00:28	02:13	03:52
68	17:40	17:34	17:28	00:49	02:25	03:57
66	17:29	17:28	17:26	01:06	02:35	04:02
64	17:20	17:22	17:25	01:19	02:43	04:06
62	17:11	17:18	17:23	01:31	02:50	04:09
60	17:04	17:14	17:22	01:40	02:56	04:12
58	16:58	17:10	17:21	01:48	03:02	04:15
56	16:52	17:07	17:20	01:56	03:07	04:17
54	16:47	17:04	17:19	02:02	03:11	04:19
52	16:43	17:01	17:18	02:08	03:15	04:21
50	16:39	16:59	17:17	02:13	03:18	04:23
45	16:30	16:53	17:16	02:25	03:26	04:27
40	16:22	16:49	17:14	02:34	03:32	04:30
35	16:16	16:45	17:13	02:42	03:37	04:32
30	16:10	16:42	17:12	02:49	03:42	04:35
20	16:00	16:36	17:10	03:01	03:50	04:39
10	15:52	16:30	17:08	03:12	03:57	04:42
0	15:44	16:26	17:07	03:21	04:04	04:46
-10	15:35	16:21	17:05	03:31	04:10	04:49
-20	15:27	16:15	17:04	03:41	04:17	04:52
-30	15:16	16:09	17:02	03:53	04:25	04:56
-35	15:11	16:06	17:01	03:60	04:30	04:58
-40	15:04	16:02	16:60	04:07	04:35	05:01
-45	14:56	15:57	16:58	04:16	04:41	05:04
-50	14:47	15:52	16:57	04:27	04:48	05:07
-52	14:43	15:49	16:56	04:32	04:51	05:09
-54	14:38	15:46	16:55	04:37	04:55	05:10
-56	14:33	15:43	16:54	04:43	04:59	05:12
-58	14:27	15:40	16:53	04:50	05:03	05:14
-60	14:20	15:36	16:52	04:57	05:08	05:16

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
10	12:48	12:56	11:47	21:53	09:32	12(90%)
11	13:04	13:12	11:46	22:35	10:14	13(95%)
12	13:20	13:28	11:46	23:16	10:56	14(98%)

October 13, 14 ,15 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	21°15.9	168°03.5	-12°49.6	195°40.8	-1°24.4	122°08.7	-22°49.5	95°38.6	-22°29.9
1	36°18.4	183°03.0	-12°50.8	210°41.8	-1°25.0	137°10.8	-22°49.5	110°41.0	-22°29.8
2	51°20.9	198°02.5	-12°51.9	225°42.7	-1°25.7	152°12.8	-22°49.6	125°43.3	-22°29.8
3	66°23.3	213°02.0	-12°53.0	240°43.7	-1°26.3	167°14.8	-22°49.6	140°45.7	-22°29.8
4	81°25.8	228°01.4	-12°54.1	255°44.7	-1°27.0	182°16.8	-22°49.6	155°48.0	-22°29.8
5	96°28.2	243°00.9	-12°55.3	270°45.7	-1°27.6	197°18.9	-22°49.7	170°50.4	-22°29.8
6	111°30.7	258°00.4	-12°56.4	285°46.7	-1°28.3	212°20.9	-22°49.7	185°52.7	-22°29.8
7	126°33.2	272°59.9	-12°57.5	300°47.7	-1°28.9	227°22.9	-22°49.7	200°55.1	-22°29.8
8	141°35.6	287°59.4	-12°58.6	315°48.7	-1°29.6	242°25.0	-22°49.8	215°57.5	-22°29.8
9	156°38.1	302°58.9	-12°59.7	330°49.6	-1°30.2	257°27.0	-22°49.8	230°59.8	-22°29.8
10	171°40.6	317°58.4	-13°00.9	345°50.6	-1°30.9	272°29.0	-22°49.8	246°02.2	-22°29.8
11	186°43.0	332°57.9	-13°02.0	0°51.6	-1°31.5	287°31.0	-22°49.9	261°04.5	-22°29.8
12	201°45.5	347°57.4	-13°03.1	15°52.6	-1°32.2	302°33.1	-22°49.9	276°06.9	-22°29.8
13	216°48.0	2°56.8	-13°04.2	30°53.6	-1°32.8	317°35.1	-22°50.0	291°09.2	-22°29.8
14	231°50.4	17°56.3	-13°05.3	45°54.6	-1°33.5	332°37.1	-22°50.0	306°11.6	-22°29.8
15	246°52.9	32°55.8	-13°06.5	60°55.6	-1°34.1	347°39.1	-22°50.0	321°13.9	-22°29.8
16	261°55.4	47°55.3	-13°07.6	75°56.5	-1°34.8	2°41.2	-22°50.1	336°16.3	-22°29.7
17	276°57.8	62°54.8	-13°08.7	90°57.5	-1°35.4	17°43.2	-22°50.1	351°18.6	-22°29.7
18	292°00.3	77°54.3	-13°09.8	105°58.5	-1°36.1	32°45.2	-22°50.1	6°21.0	-22°29.7
19	307°02.7	92°53.8	-13°10.9	120°59.5	-1°36.7	47°47.2	-22°50.2	21°23.3	-22°29.7
20	322°05.2	107°53.2	-13°12.0	136°00.5	-1°37.4	62°49.2	-22°50.2	36°25.7	-22°29.7
21	337°07.7	122°52.7	-13°13.1	151°01.5	-1°38.0	77°51.3	-22°50.2	51°28.1	-22°29.7
22	352°10.1	137°52.2	-13°14.3	166°02.5	-1°38.7	92°53.3	-22°50.3	66°30.4	-22°29.7
23	7°12.6	152°51.7	-13°15.4	181°03.4	-1°39.3	107°55.3	-22°50.3	81°32.8	-22°29.7
	Mer.pass.:22:31	v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.4 d0.0 m0.5	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	22°15.1	167°51.2	-13°16.5	196°04.4	-1°40.0	122°57.3	-22°50.4	96°35.1	-22°29.7
1	37°17.5	182°50.6	-13°17.6	211°05.4	-1°40.6	137°59.4	-22°50.4	111°37.5	-22°29.7
2	52°20.0	197°50.1	-13°18.7	226°06.4	-1°41.3	153°01.4	-22°50.4	126°39.8	-22°29.7
3	67°22.5	212°49.6	-13°19.8	241°07.4	-1°41.9	168°03.4	-22°50.5	141°42.2	-22°29.7
4	82°24.9	227°49.1	-13°20.9	256°08.4	-1°42.6	183°05.4	-22°50.5	156°44.5	-22°29.7
5	97°27.4	242°48.6	-13°22.0	271°09.4	-1°43.2	198°07.5	-22°50.5	171°46.9	-22°29.6
6	112°29.8	257°48.0	-13°23.2	286°10.3	-1°43.9	213°09.5	-22°50.6	186°49.2	-22°29.6
7	127°32.3	272°47.5	-13°24.3	301°11.3	-1°44.5	228°11.5	-22°50.6	201°51.6	-22°29.6
8	142°34.8	287°47.0	-13°25.4	316°12.3	-1°45.1	243°13.5	-22°50.6	216°53.9	-22°29.6
9	157°37.2	302°46.5	-13°26.5	331°13.3	-1°45.8	258°15.5	-22°50.7	231°56.3	-22°29.6
10	172°39.7	317°46.0	-13°27.6	346°14.3	-1°46.4	273°17.6	-22°50.7	246°58.6	-22°29.6
11	187°42.2	332°45.4	-13°28.7	1°15.3	-1°47.1	288°19.6	-22°50.7	262°01.0	-22°29.6
12	202°44.6	347°44.9	-13°29.8	16°16.2	-1°47.7	303°21.6	-22°50.8	277°03.3	-22°29.6
13	217°47.1	2°44.4	-13°30.9	31°17.2	-1°48.4	318°23.6	-22°50.8	292°05.7	-22°29.6
14	232°49.6	17°43.9	-13°32.0	46°18.2	-1°49.0	333°25.6	-22°50.8	307°08.0	-22°29.6
15	247°52.0	32°43.3	-13°33.1	61°19.2	-1°49.7	348°27.7	-22°50.9	322°10.4	-22°29.6
16	262°54.5	47°42.8	-13°34.2	76°20.2	-1°50.3	3°29.7	-22°50.9	337°12.7	-22°29.6
17	277°57.0	62°42.3	-13°35.3	91°21.2	-1°51.0	18°31.7	-22°51.0	352°15.1	-22°29.6
18	292°59.4	77°41.8	-13°36.4	106°22.1	-1°51.6	33°33.7	-22°51.0	7°17.4	-22°29.6
19	308°01.9	92°41.2	-13°37.5	121°23.1	-1°52.3	48°35.7	-22°51.0	22°19.8	-22°29.5
20	323°04.3	107°40.7	-13°38.6	136°24.1	-1°52.9	63°37.8	-22°51.1	37°22.1	-22°29.5
21	338°06.8	122°40.2	-13°39.7	151°25.1	-1°53.6	78°39.8	-22°51.1	52°24.5	-22°29.5
22	353°09.3	137°39.7	-13°40.8	166°26.1	-1°54.2	93°41.8	-22°51.1	67°26.8	-22°29.5
23	8°11.7	152°39.1	-13°41.9	181°27.1	-1°54.9	108°43.8	-22°51.2	82°29.2	-22°29.5
	Mer.pass.:22:27	v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.4 d0.0 m0.5	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	23°14.2	167°38.6	-13°43.0	196°28.1	-1°55.5	123°45.8	-22°51.2	97°31.5	-22°29.5
1	38°16.7	182°38.1	-13°44.1	211°29.0	-1°56.2	138°47.8	-22°51.2	112°33.9	-22°29.5
2	53°19.1	197°37.5	-13°45.2	226°30.0	-1°56.8	153°49.9	-22°51.3	127°36.2	-22°29.5
3	68°21.6	212°37.0	-13°46.3	241°31.0	-1°57.5	168°51.9	-22°51.3	142°38.6	-22°29.5
4	83°24.1	227°36.5	-13°47.4	256°32.0	-1°58.1	183°53.9	-22°51.3	157°40.9	-22°29.5
5	98°26.5	242°35.9	-13°48.5	271°33.0	-1°58.8	198°55.9	-22°51.4	172°43.2	-22°29.5
6	113°29.0	257°35.4	-13°49.6	286°34.0	-1°59.4	213°57.9	-22°51.4	187°45.6	-22°29.5
7	128°31.4	272°34.9	-13°50.7	301°34.9	-2°00.1	228°59.9	-22°51.5	202°47.9	-22°29.5
8	143°33.9	287°34.3	-13°51.8	316°35.9	-2°00.7	244°02.0	-22°51.5	217°50.3	-22°29.4
9	158°36.4	302°33.8	-13°52.9	331°36.9	-2°01.4	259°04.0	-22°51.5	232°52.6	-22°29.4
10	173°38.8	317°33.3	-13°54.0	346°37.9	-2°02.0	274°06.0	-22°51.6	247°55.0	-22°29.4
11	188°41.3	332°32.7	-13°55.1	1°38.9	-2°02.7	289°08.0	-22°51.6	262°57.3	-22°29.4
12	203°43.8	347°32.2	-13°56.2	16°39.9	-2°03.3	304°10.0	-22°51.6	277°59.7	-22°29.4
13	218°46.2	2°31.7	-13°57.3	31°40.8	-2°04.0	319°12.0	-22°51.7	293°02.0	-22°29.4
14	233°48.7	17°31.1	-13°58.3	46°41.8	-2°04.6	334°14.1	-22°51.7	308°04.4	-22°29.4
15	248°51.2	32°30.6	-13°59.4	61°42.8	-2°05.3	349°16.1	-22°51.7	323°06.7	-22°29.4
16	263°53.6	47°30.1	-14°00.5	76°43.8	-2°05.9	4°18.1	-22°51.8	338°09.1	-22°29.4
17	278°56.1	62°29.5	-14°01.6	91°44.8	-2°06.6	19°20.1	-22°51.8	353°11.4	-22°29.4
18	293°58.6	77°29.0	-14°02.7	106°45.8	-2°07.2	34°22.1	-22°51.8	8°13.7	-22°29.4
19	309°01.0	92°28.5	-14°03.8	121°46.7	-2°07.9	49°24.1	-22°51.9	23°16.1	-22°29.4
20	324°03.5	107°27.9	-14°04.9	136°47.7	-2°08.5	64°26.1	-22°51.9	38°18.4	-22°29.3
21	339°05.9	122°27.4	-14°06.0	151°48.7	-2°09.2	79°28.2	-22°51.9	53°20.8	-22°29.3
22	354°08.4	137°26.8	-14°07.0	166°49.7	-2°09.8	94°30.2	-22°52.0	68°23.1	-22°29.3
23	9°10.9	152°26.3	-14°08.1	181°50.7	-2°10.5	109°32.2	-22°52.0	83°25.5	-22°29.3
	Mer.pass.:22:23	v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Stars

	SHA	Dec
Alpheratz	357°38.7	29°12.0
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.7
Achernar	335°22.9	-57°08.2
Hamal	327°55.6	23°33.3
Polaris	315°28.5	89°20.6
Akamar	315°14.7	-40°13.5
Menkar	314°10.2	4°10.0
Mirfak	308°33.7	49°55.7
Aldebaran	290°44.2	16°32.9
Rigel	281°07.7	-8°10.7
Capella	280°27.8	46°00.9
Bellatrix	278°27.2	6°22.0
Elnath	278°07.0	28°37.3
Alnilam	275°41.8	-1°11.4
Betelgeuse	270°56.5	7°24.6
Canopus	263°54.1	-52°42.1
Sirius	258°29.8	-16°44.3
Adara	255°09.1	-28°59.7
Procyon	244°55.2	5°10.6
Pollux	243°22.4	27°58.6
Avior	234°16.5	-59°34.0
Suhail	222°49.5	-43°30.4
Miaplacidus	221°39.3	-69°47.5
Alphard	217°52.0	-8°44.5
Regulus	207°39.1	11°52.4
Dubhe	193°46.9	61°38.6
Denebola	182°29.5	14°27.9
Gienah	175°48.2	-17°38.8
Acrux	173°05.2	-63°12.2
Gacrux	171°56.7	-57°13.2
Alioth	166°17.4	55°51.3
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.1
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.1	74°04.7
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.5	-69°03.8
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.6	12°33.1
Etamin	90°44.3	51°29.6
Kaus Aust.	83°38.2	-34°22.5
Vega	80°36.2	38°48.4
Nunki	75°53.0	-26°16.3
Altair	62°04.1	8°55.4
Peacock	53°12.3	-56°40.4
Deneb	49°28.4	45°21.3
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	SHA	Mer.pass
Venus	146°47.6	12:48
Mars	174°24.8	10:57
Jupiter	100°52.8	15:49
Saturn	74°22.7	17:35

2019/10/	SHA	Mer.pass
Venus	145°36.1	12:49
Mars	173°49.4	10:55
Jupiter	100°42.3	15:46
Saturn	74°20.0	17:31

2019/10/	SHA	Mer.pass
Venus	144°24.4	12:50
Mars	173°13.8	10:53
Jupiter	100°31.6	15:43
Saturn	74°17.3	17:27

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°23.8	-7°34.6	10°29.0	15.9	-0°47.0	11.6	54.3
1	198°24.0	-7°35.5	25°03.8	15.9	-0°35.3	11.6	54.3
2	213°24.2	-7°36.5	39°38.7	15.9	-0°23.7	11.6	54.3
3	228°24.3	-7°37.4	54°13.5	15.8	-0°12.1	11.6	54.3
4	243°24.5	-7°38.3	68°48.4	15.8	-0°00.4	11.7	54.3
5	258°24.6	-7°39.3	83°23.2	15.8	0°11.2	11.7	54.3
6	273°24.8	-7°40.2	97°58.0	15.8	0°22.9	11.7	54.3
7	288°24.9	-7°41.1	112°32.8	15.8	0°34.6	11.7	54.3
8	303°25.1	-7°42.1	127°07.6	15.8	0°46.2	11.7	54.4
9	318°25.2	-7°43.0	141°42.4	15.8	0°57.9	11.7	54.4
10	333°25.4	-7°43.9	156°17.2	15.8	1°09.6	11.7	54.4
11	348°25.5	-7°44.9	170°51.9	15.7	1°21.2	11.7	54.4
12	3°25.7	-7°45.8	185°26.7	15.7	1°32.9	11.7	54.4
13	18°25.8	-7°46.7	200°01.4	15.7	1°44.6	11.7	54.4
14	33°26.0	-7°47.7	214°36.1	15.7	1°56.2	11.7	54.4
15	48°26.1	-7°48.6	229°10.8	15.7	2°07.9	11.7	54.4
16	63°26.3	-7°49.5	243°45.5	15.7	2°19.5	11.7	54.4
17	78°26.4	-7°50.5	258°20.1	15.6	2°31.2	11.7	54.4
18	93°26.6	-7°51.4	272°54.8	15.6	2°42.8	11.6	54.5
19	108°26.7	-7°52.3	287°29.4	15.6	2°54.5	11.6	54.5
20	123°26.9	-7°53.3	302°04.0	15.6	3°06.1	11.6	54.5
21	138°27.1	-7°54.2	316°38.5	15.6	3°17.8	11.6	54.5
22	153°27.2	-7°55.1	331°13.1	15.5	3°29.4	11.6	54.5
23	168°27.4	-7°56.1	345°47.6	15.5	3°41.0	11.6	54.5
	SD.=16.0	d=-0.9			S.D.=14.8		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°27.5	-7°57.0	0°22.1	15.5	3°52.6	11.6	54.5
1	198°27.6	-7°57.9	14°56.6	15.5	4°04.2	11.6	54.5
2	213°27.8	-7°58.9	29°31.0	15.4	4°15.8	11.6	54.6
3	228°27.9	-7°59.8	44°05.4	15.4	4°27.4	11.6	54.6
4	243°28.1	-8°00.7	58°39.8	15.4	4°38.9	11.6	54.6
5	258°28.2	-8°01.7	73°14.2	15.4	4°50.5	11.5	54.6
6	273°28.4	-8°02.6	87°48.5	15.3	5°02.0	11.5	54.6
7	288°28.5	-8°03.5	102°22.9	15.3	5°13.5	11.5	54.6
8	303°28.7	-8°04.5	116°57.1	15.3	5°25.0	11.5	54.6
9	318°28.8	-8°05.4	131°31.4	15.2	5°36.5	11.5	54.6
10	333°29.0	-8°06.3	146°05.6	15.2	5°48.0	11.5	54.7
11	348°29.1	-8°07.2	160°39.8	15.2	5°59.4	11.4	54.7
12	3°29.3	-8°08.2	175°13.9	15.1	6°10.9	11.4	54.7
13	18°29.4	-8°09.1	189°48.1	15.1	6°22.3	11.4	54.7
14	33°29.6	-8°10.0	204°22.1	15.1	6°33.7	11.4	54.7
15	48°29.7	-8°11.0	218°56.2	15.0	6°45.1	11.4	54.7
16	63°29.9	-8°11.9	233°30.2	15.0	6°56.4	11.3	54.7
17	78°30.0	-8°12.8	248°04.2	15.0	7°07.8	11.3	54.7
18	93°30.2	-8°13.7	262°38.1	14.9	7°19.1	11.3	54.8
19	108°30.3	-8°14.7	277°12.0	14.9	7°30.4	11.3	54.8
20	123°30.4	-8°15.6	291°45.9	14.8	7°41.6	11.2	54.8
21	138°30.6	-8°16.5	306°19.7	14.8	7°52.9	11.2	54.8
22	153°30.7	-8°17.5	320°53.5	14.8	8°04.1	11.2	54.8
23	168°30.9	-8°18.4	335°27.2	14.7	8°15.2	11.2	54.8
	SD.=16.0	d=-0.9			S.D.=14.9		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°31.0	-8°19.3	350°00.9	14.7	8°26.4	11.1	54.9
1	198°31.2	-8°20.2	4°34.6	14.6	8°37.5	11.1	54.9
2	213°31.3	-8°21.2	19°08.2	14.6	8°48.6	11.1	54.9
3	228°31.5	-8°22.1	33°41.8	14.6	8°59.7	11.0	54.9
4	243°31.6	-8°23.0	48°15.3	14.5	9°10.7	11.0	54.9
5	258°31.7	-8°23.9	62°48.8	14.5	9°21.7	11.0	54.9
6	273°31.9	-8°24.9	77°22.3	14.4	9°32.7	10.9	54.9
7	288°32.0	-8°25.8	91°55.6	14.4	9°43.6	10.9	55.0
8	303°32.2	-8°26.7	106°29.0	14.3	9°54.5	10.9	55.0
9	318°32.3	-8°27.6	121°02.3	14.3	10°05.4	10.8	55.0
10	333°32.5	-8°28.6	135°35.5	14.2	10°16.2	10.8	55.0
11	348°32.6	-8°29.5	150°08.8	14.2	10°27.0	10.8	55.0
12	3°32.7	-8°30.4	164°41.9	14.1	10°37.7	10.7	55.0
13	18°32.9	-8°31.3	179°15.0	14.1	10°48.4	10.7	55.1
14	33°33.0	-8°32.3	193°48.1	14.0	10°59.1	10.6	55.1
15	48°33.2	-8°33.2	208°21.1	14.0	11°09.7	10.6	55.1
16	63°33.3	-8°34.1	222°54.0	13.9	11°20.3	10.6	55.1
17	78°33.4	-8°35.0	237°26.9	13.9	11°30.9	10.5	55.1
18	93°33.6	-8°36.0	251°59.8	13.8	11°41.4	10.5	55.1
19	108°33.7	-8°36.9	266°32.6	13.8	11°51.8	10.4	55.2
20	123°33.9	-8°37.8	281°05.3	13.7	12°02.2	10.4	55.2
21	138°34.0	-8°38.7	295°38.0	13.7	12°12.6	10.3	55.2
22	153°34.1	-8°39.6	310°10.6	13.6	12°22.9	10.3	55.2
23	168°34.3	-8°40.6	324°43.2	13.5	12°33.2	10.2	55.2
	SD.=16.0	d=-0.9			S.D.=15.0		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	04:49	06:08	07:18	16:13	17:22	18:40
70	04:54	06:04	07:07	16:23	17:26	18:36
68	04:57	06:02	06:59	16:32	17:29	18:33
66	05:00	05:59	06:52	16:39	17:31	18:30
64	05:02	05:57	06:46	16:45	17:33	18:28
62	05:04	05:55	06:40	16:50	17:35	18:26
60	05:06	05:54	06:36	16:55	17:37	18:25
58	05:07	05:52	06:32	16:59	17:39	18:24
56	05:08	05:51	06:28	17:03	17:40	18:23
54	05:09	05:50	06:25	17:06	17:42	18:22
52	05:09	05:48	06:22	17:09	17:43	18:22
50	05:10	05:47	06:20	17:12	17:44	18:21
45	05:10	05:44	06:14	17:18	17:47	18:21
40	05:10	05:42	06:09	17:23	17:50	18:21
35	05:10	05:39	06:05	17:27	17:52	18:22
30	05:09	05:37	06:01	17:31	17:55	18:23
20	05:06	05:32	05:54	17:38	17:60	18:25
10	05:03	05:27	05:48	17:44	18:05	18:29
0	04:58	05:22	05:43	17:49	18:10	18:34
-10	04:51	05:16	05:37	17:55	18:16	18:41
-20	04:42	05:08	05:31	18:02	18:24	18:50
-30	04:31	04:59	05:24	18:09	18:33	19:02
-35	04:23	04:54	05:19	18:13	18:39	19:10
-40	04:14	04:47	05:14	18:18	18:46	19:19
-45	04:02	04:39	05:09	18:24	18:54	19:31
-50	03:48	04:29	05:02	18:31	19:05	19:46
-52	03:41	04:24	04:59	18:34	19:10	19:53
-54	03:32	04:18	04:56	18:38	19:15	20:01
-56	03:23	04:12	04:52	18:42	19:21	20:11
-58	03:13	04:06	04:47	18:46	19:28	20:22
-60	02:60	03:58	04:43	18:51	19:36	20:35

Lat.	Moonrise			Moonset		
	Sun	Mon	Tue	Sun	Mon	Tue
72	17:17	16:59	16:37	05:30	07:16	09:08
70	17:20	17:08	16:56	05:29	07:08	08:51
68	17:23	17:17	17:10	05:29	07:02	08:38
66	17:25	17:23	17:22	05:29	06:57	08:27
64	17:27	17:29	17:33	05:29	06:52	08:18
62	17:29	17:34	17:41	05:29	06:49	08:10
60	17:30	17:39	17:49	05:28	06:45	08:04
58	17:31	17:43	17:55	05:28	06:43	07:58
56	17:33	17:46	18:01	05:28	06:40	07:53
54	17:34	17:49	18:07	05:28	06:38	07:48
52	17:35	17:52	18:11	05:28	06:36	07:44
50	17:36	17:55	18:16	05:28	06:34	07:41
45	17:38	18:01	18:25	05:28	06:30	07:33
40	17:39	18:05	18:33	05:28	06:26	07:26
35	17:41	18:09	18:40	05:28	06:23	07:20
30	17:42	18:13	18:46	05:27	06:21	07:15
20	17:44	18:20	18:57	05:27	06:16	07:06
10	17:46	18:25	19:06	05:27	06:12	06:59
0	17:48	18:31	19:15	05:27	06:09	06:52
-10	17:50	18:36	19:24	05:27	06:05	06:45
-20	17:52	18:42	19:33	05:26	06:01	06:37
-30	17:55	18:49	19:44	05:26	05:57	06:28
-35	17:56	18:53	19:50	05:26	05:54	06:23
-40	17:58	18:57	19:57	05:26	05:51	06:18
-45	17:60	19:02	20:06	05:26	05:48	06:11
-50	18:02	19:08	20:16	05:25	05:44	06:04
-52	18:03	19:11	20:21	05:25	05:42	06:00
-54	18:04	19:14	20:26	05:25	05:40	05:56
-56	18:05	19:18	20:32	05:25	05:38	05:52
-58	18:07	19:22	20:38	05:25	05:35	05:47
-60	18:08	19:26	20:46	05:25	05:33	05:42

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
13	13:35	13:43	11:46	23:58	11:37	15(100%)
14	13:50	13:57	11:46	00:41	12:19	16(99%)
15	14:04	14:11	11:45	00:41	13:03	17(97%)

October 16, 17 ,18 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	24°13.3	167°25.8	-14°09.2	196°51.6	-2°11.1	124°34.2	-22°52.1	98°27.8	-22°29.3
1	39°15.8	182°25.2	-14°10.3	211°52.6	-2°11.8	139°36.2	-22°52.1	113°30.2	-22°29.3
2	54°18.3	197°24.7	-14°11.4	226°53.6	-2°12.4	154°38.2	-22°52.1	128°32.5	-22°29.3
3	69°20.7	212°24.1	-14°12.5	241°54.6	-2°13.1	169°40.2	-22°52.2	143°34.8	-22°29.3
4	84°23.2	227°23.6	-14°13.6	256°55.6	-2°13.7	184°42.2	-22°52.2	158°37.2	-22°29.3
5	99°25.7	242°23.1	-14°14.6	271°56.6	-2°14.4	199°44.3	-22°52.2	173°39.5	-22°29.3
6	114°28.1	257°22.5	-14°15.7	286°57.5	-2°15.0	214°46.3	-22°52.3	188°41.9	-22°29.3
7	129°30.6	272°22.0	-14°16.8	301°58.5	-2°15.7	229°48.3	-22°52.3	203°44.2	-22°29.3
8	144°33.1	287°21.4	-14°17.9	316°59.5	-2°16.3	244°50.3	-22°52.3	218°46.6	-22°29.2
9	159°35.5	302°20.9	-14°19.0	332°00.5	-2°17.0	259°52.3	-22°52.4	233°48.9	-22°29.2
10	174°38.0	317°20.3	-14°20.0	347°01.5	-2°17.6	274°54.3	-22°52.4	248°51.2	-22°29.2
11	189°40.4	332°19.8	-14°21.1	2°02.5	-2°18.3	289°56.3	-22°52.4	263°53.6	-22°29.2
12	204°42.9	347°19.2	-14°22.2	17°03.4	-2°18.9	304°58.3	-22°52.5	278°55.9	-22°29.2
13	219°45.4	2°18.7	-14°23.3	32°04.4	-2°19.6	320°00.3	-22°52.5	293°58.3	-22°29.2
14	234°47.8	17°18.1	-14°24.3	47°05.4	-2°20.2	335°02.4	-22°52.5	309°00.6	-22°29.2
15	249°50.3	32°17.6	-14°25.4	62°06.4	-2°20.9	350°04.4	-22°52.6	324°03.0	-22°29.2
16	264°52.8	47°17.1	-14°26.5	77°07.4	-2°21.5	5°06.4	-22°52.6	339°05.3	-22°29.2
17	279°55.2	62°16.5	-14°27.6	92°08.3	-2°22.1	20°08.4	-22°52.7	354°07.6	-22°29.2
18	294°57.7	77°16.0	-14°28.6	107°09.3	-2°22.8	35°10.4	-22°52.7	9°10.0	-22°29.2
19	310°00.2	92°15.4	-14°29.7	122°10.3	-2°23.4	50°12.4	-22°52.7	24°12.3	-22°29.2
20	325°02.6	107°14.9	-14°30.8	137°11.3	-2°24.1	65°14.4	-22°52.8	39°14.7	-22°29.1
21	340°05.1	122°14.3	-14°31.9	152°12.3	-2°24.7	80°16.4	-22°52.8	54°17.0	-22°29.1
22	355°07.5	137°13.8	-14°32.9	167°13.2	-2°25.4	95°18.4	-22°52.8	69°19.3	-22°29.1
23	10°10.0	152°13.2	-14°34.0	182°14.2	-2°26.0	110°20.4	-22°52.9	84°21.7	-22°29.1
Mer.pass.:22:19		v-0.5 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	25°12.5	167°12.7	-14°35.1	197°15.2	-2°26.7	125°22.4	-22°52.9	99°24.0	-22°29.1
1	40°14.9	182°12.1	-14°36.1	212°16.2	-2°27.3	140°24.5	-22°52.9	114°26.4	-22°29.1
2	55°17.4	197°11.6	-14°37.2	227°17.2	-2°28.0	155°26.5	-22°53.0	129°28.7	-22°29.1
3	70°19.9	212°11.0	-14°38.3	242°18.2	-2°28.6	170°28.5	-22°53.0	144°31.0	-22°29.1
4	85°22.3	227°10.4	-14°39.3	257°19.1	-2°29.3	185°30.5	-22°53.0	159°33.4	-22°29.1
5	100°24.8	242°09.9	-14°40.4	272°20.1	-2°29.9	200°32.5	-22°53.1	174°35.7	-22°29.1
6	115°27.3	257°09.3	-14°41.5	287°21.1	-2°30.6	215°34.5	-22°53.1	189°38.1	-22°29.1
7	130°29.7	272°08.8	-14°42.5	302°22.1	-2°31.2	230°36.5	-22°53.1	204°40.4	-22°29.1
8	145°32.2	287°08.2	-14°43.6	317°23.1	-2°31.9	245°38.5	-22°53.2	219°42.7	-22°29.0
9	160°34.7	302°07.7	-14°44.7	332°24.0	-2°32.5	260°40.5	-22°53.2	234°45.1	-22°29.0
10	175°37.1	317°07.1	-14°45.7	347°25.0	-2°33.2	275°42.5	-22°53.2	249°47.4	-22°29.0
11	190°39.6	332°06.6	-14°46.8	2°26.0	-2°33.8	290°44.5	-22°53.3	264°49.8	-22°29.0
12	205°42.0	347°06.0	-14°47.9	17°27.0	-2°34.5	305°46.5	-22°53.3	279°52.1	-22°29.0
13	220°44.5	2°05.4	-14°48.9	32°28.0	-2°35.1	320°48.5	-22°53.4	294°54.4	-22°29.0
14	235°47.0	17°04.9	-14°50.0	47°28.9	-2°35.8	335°50.5	-22°53.4	309°56.8	-22°29.0
15	250°49.4	32°04.3	-14°51.1	62°29.9	-2°36.4	350°52.5	-22°53.4	324°59.1	-22°29.0
16	265°51.9	47°03.8	-14°52.1	77°30.9	-2°37.1	5°54.5	-22°53.5	340°01.4	-22°29.0
17	280°54.4	62°03.2	-14°53.2	92°31.9	-2°37.7	20°56.6	-22°53.5	355°03.8	-22°29.0
18	295°56.8	77°02.6	-14°54.2	107°32.9	-2°38.4	35°58.6	-22°53.5	10°06.1	-22°29.0
19	310°59.3	92°02.1	-14°55.3	122°33.8	-2°39.0	51°00.6	-22°53.6	25°08.5	-22°28.9
20	326°01.8	107°01.5	-14°56.3	137°34.8	-2°39.7	66°02.6	-22°53.6	40°10.8	-22°28.9
21	341°04.2	122°01.0	-14°57.4	152°35.8	-2°40.3	81°04.6	-22°53.6	55°13.1	-22°28.9
22	356°06.7	137°00.4	-14°58.5	167°36.8	-2°40.9	96°06.6	-22°53.7	70°15.5	-22°28.9
23	11°09.2	151°59.8	-14°59.5	182°37.8	-2°41.6	111°08.6	-22°53.7	85°17.8	-22°28.9
Mer.pass.:22:15		v-0.6 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	26°11.6	166°59.3	-15°00.6	197°38.7	-2°42.2	126°10.6	-22°53.7	100°20.1	-22°28.9
1	41°14.1	181°58.7	-15°01.6	212°39.7	-2°42.9	141°12.6	-22°53.8	115°22.5	-22°28.9
2	56°16.5	196°58.1	-15°02.7	227°40.7	-2°43.5	156°14.6	-22°53.8	130°24.8	-22°28.9
3	71°19.0	211°57.6	-15°03.7	242°41.7	-2°44.2	171°16.6	-22°53.8	145°27.1	-22°28.9
4	86°21.5	226°57.0	-15°04.8	257°42.7	-2°44.8	186°18.6	-22°53.9	160°29.5	-22°28.9
5	101°23.9	241°56.5	-15°05.8	272°43.6	-2°45.5	201°20.6	-22°53.9	175°31.8	-22°28.9
6	116°26.4	256°55.9	-15°06.9	287°44.6	-2°46.1	216°22.6	-22°53.9	190°34.1	-22°28.8
7	131°28.9	271°55.3	-15°07.9	302°45.6	-2°46.8	231°24.6	-22°54.0	205°36.5	-22°28.8
8	146°31.3	286°54.8	-15°09.0	317°46.6	-2°47.4	246°26.6	-22°54.0	220°38.8	-22°28.8
9	161°33.8	301°54.2	-15°10.0	332°47.6	-2°48.1	261°28.6	-22°54.0	235°41.1	-22°28.8
10	176°36.3	316°53.6	-15°11.1	347°48.5	-2°48.7	276°30.6	-22°54.1	250°43.5	-22°28.8
11	191°38.7	331°53.0	-15°12.1	2°49.5	-2°49.4	291°32.6	-22°54.1	265°45.8	-22°28.8
12	206°41.2	346°52.5	-15°13.2	17°50.5	-2°50.0	306°34.6	-22°54.2	280°48.1	-22°28.8
13	221°43.7	1°51.9	-15°14.2	32°51.5	-2°50.7	321°36.6	-22°54.2	295°50.5	-22°28.8
14	236°46.1	16°51.3	-15°15.3	47°52.5	-2°51.3	336°38.6	-22°54.2	310°52.8	-22°28.8
15	251°48.6	31°50.8	-15°16.3	62°53.4	-2°52.0	351°40.6	-22°54.3	325°55.2	-22°28.8
16	266°51.0	46°50.2	-15°17.4	77°54.4	-2°52.6	6°42.6	-22°54.3	340°57.5	-22°28.8
17	281°53.5	61°49.6	-15°18.4	92°55.4	-2°53.3	21°44.6	-22°54.3	355°59.8	-22°28.7
18	296°56.0	76°49.1	-15°19.5	107°56.4	-2°53.9	36°46.6	-22°54.4	11°02.2	-22°28.7
19	311°58.4	91°48.5	-15°20.5	122°57.3	-2°54.5	51°48.6	-22°54.4	26°04.5	-22°28.7
20	327°00.9	106°47.9	-15°21.5	137°58.3	-2°55.2	66°50.6	-22°54.4	41°06.8	-22°28.7
21	342°03.4	121°47.3	-15°22.6	152°59.3	-2°55.8	81°52.6	-22°54.5	56°09.1	-22°28.7
22	357°05.8	136°46.8	-15°23.6	168°00.3	-2°56.5	96°54.6	-22°54.5	71°11.5	-22°28.7
23	12°08.3	151°46.2	-15°24.7	183°01.3	-2°57.1	111°56.6	-22°54.5	86°13.8	-22°28.7
Mer.pass.:22:11		v-0.6 d-1.1 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Stars

	SHA	**Dec**
Alpheratz	357°38.7	29°12.1
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.7
Achernar	335°22.9	-57°08.3
Hamal	327°55.6	23°33.3
Polaris	315°27.7	89°20.6
Akamar	315°14.6	-40°13.5
Menkar	314°10.2	4°10.0
Mirfak	308°33.7	49°55.7
Aldebaran	290°44.2	16°32.9
Rigel	281°07.7	-8°10.7
Capella	280°27.8	46°00.9
Bellatrix	278°27.2	6°22.0
Elnath	278°07.0	28°37.3
Alnilam	275°41.8	-1°11.4
Betelgeuse	270°56.5	7°24.6
Canopus	263°54.1	-52°42.1
Sirius	258°29.7	-16°44.3
Adara	255°09.1	-28°59.8
Procyon	244°55.1	5°10.6
Pollux	243°22.4	27°58.6
Avior	234°16.4	-59°34.0
Suhail	222°49.4	-43°30.4
Miaplacidus	221°39.2	-69°47.5
Alphard	217°52.0	-8°44.5
Regulus	207°39.1	11°52.3
Dubhe	193°46.9	61°38.6
Denebola	182°29.5	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°05.2	-63°12.2
Gacrux	171°56.7	-57°13.1
Alioth	166°17.4	55°51.3
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.1
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.1	74°04.7
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.5	-69°03.8
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.6	12°33.1
Etamin	90°44.4	51°29.6
Kaus Aust.	83°38.2	-34°22.4
Vega	80°36.2	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.1	8°55.4
Peacock	53°12.3	-56°40.4
Deneb	49°28.5	45°21.4
Enif	33°42.7	9°58.1
Alnair	27°38.0	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	**SHA**	**Mer.pass**
Venus	143°12.4	12:51
Mars	172°38.3	10:52
Jupiter	100°20.9	15:40
Saturn	74°14.5	17:23

2019/10/	**SHA**	**Mer.pass**
Venus	142°00.2	12:52
Mars	172°02.7	10:50
Jupiter	100°10.0	15:36
Saturn	74°11.5	17:20

2019/10/	**SHA**	**Mer.pass**
Venus	140°47.7	12:53
Mars	171°27.1	10:49
Jupiter	99°59.0	15:33
Saturn	74°08.5	17:16

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°34.4	-8°41.5	339°15.7	13.5	12°43.4	10.2	55.2
1	198°34.5	-8°42.4	353°48.2	13.4	12°53.6	10.1	55.3
2	213°34.7	-8°43.3	8°20.6	13.4	13°03.7	10.1	55.3
3	228°34.8	-8°44.3	22°52.9	13.3	13°13.8	10.0	55.3
4	243°35.0	-8°45.2	37°25.2	13.3	13°23.8	10.0	55.3
5	258°35.1	-8°46.1	51°57.4	13.2	13°33.7	9.9	55.3
6	273°35.2	-8°47.0	66°29.6	13.1	13°43.7	9.9	55.3
7	288°35.4	-8°47.9	81°01.7	13.1	13°53.5	9.8	55.4
8	303°35.5	-8°48.9	95°33.8	13.0	14°03.3	9.8	55.4
9	318°35.6	-8°49.8	110°05.7	13.0	14°13.0	9.7	55.4
10	333°35.8	-8°50.7	124°37.7	12.9	14°22.7	9.6	55.4
11	348°35.9	-8°51.6	139°09.5	12.8	14°32.3	9.6	55.4
12	3°36.0	-8°52.5	153°41.3	12.8	14°41.9	9.5	55.5
13	18°36.2	-8°53.5	168°13.1	12.7	14°51.4	9.5	55.5
14	33°36.3	-8°54.4	182°44.7	12.6	15°00.8	9.4	55.5
15	48°36.5	-8°55.3	197°16.4	12.6	15°10.2	9.3	55.5
16	63°36.6	-8°56.2	211°47.9	12.5	15°19.5	9.3	55.5
17	78°36.7	-8°57.1	226°19.4	12.5	15°28.7	9.2	55.5
18	93°36.9	-8°58.1	240°50.8	12.4	15°37.9	9.1	55.6
19	108°37.0	-8°59.0	255°22.2	12.3	15°47.0	9.1	55.6
20	123°37.1	-8°59.9	269°53.4	12.3	15°56.1	9.0	55.6
21	138°37.3	-9°00.8	284°24.7	12.2	16°05.0	8.9	55.6
22	153°37.4	-9°01.7	298°55.8	12.1	16°14.0	8.9	55.6
23	168°37.5	-9°02.6	313°26.9	12.1	16°22.8	8.8	55.7
	SD.=16.0	d=-0.9			S.D.=15.1		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	183°37.7	-9°03.6	327°57.9	12.0	16°31.5	8.7	55.7
1	198°37.8	-9°04.5	342°28.9	11.9	16°40.2	8.7	55.7
2	213°37.9	-9°05.4	356°59.8	11.9	16°48.8	8.6	55.7
3	228°38.0	-9°06.3	11°30.6	11.8	16°57.4	8.5	55.7
4	243°38.2	-9°07.2	26°01.3	11.7	17°05.9	8.4	55.8
5	258°38.3	-9°08.1	40°32.0	11.6	17°14.2	8.3	55.8
6	273°38.4	-9°09.1	55°02.6	11.6	17°22.6	8.3	55.8
7	288°38.6	-9°10.0	69°33.2	11.5	17°30.8	8.2	55.8
8	303°38.7	-9°10.9	84°03.7	11.4	17°38.9	8.1	55.8
9	318°38.8	-9°11.8	98°34.1	11.4	17°47.0	8.0	55.9
10	333°39.0	-9°12.7	113°04.4	11.3	17°55.0	7.9	55.9
11	348°39.1	-9°13.6	127°34.7	11.2	18°02.9	7.9	55.9
12	3°39.2	-9°14.5	142°04.9	11.2	18°10.7	7.8	55.9
13	18°39.3	-9°15.5	156°35.0	11.1	18°18.5	7.7	55.9
14	33°39.5	-9°16.4	171°05.1	11.0	18°26.1	7.6	56.0
15	48°39.6	-9°17.3	185°35.1	11.0	18°33.7	7.5	56.0
16	63°39.7	-9°18.2	200°05.0	10.9	18°41.2	7.4	56.0
17	78°39.9	-9°19.1	214°34.8	10.8	18°48.6	7.3	56.0
18	93°40.0	-9°20.0	229°04.6	10.7	18°55.9	7.3	56.1
19	108°40.1	-9°20.9	243°34.3	10.7	19°03.1	7.2	56.1
20	123°40.2	-9°21.8	258°04.0	10.6	19°10.2	7.1	56.1
21	138°40.4	-9°22.8	272°33.5	10.5	19°17.2	7.0	56.1
22	153°40.5	-9°23.7	287°03.0	10.5	19°24.2	6.9	56.1
23	168°40.6	-9°24.6	301°32.5	10.4	19°31.0	6.8	56.2
	SD.=16.0	d=-0.9			S.D.=15.2		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°40.7	-9°25.5	316°01.8	10.3	19°37.8	6.7	56.2
1	198°40.9	-9°26.4	330°31.1	10.3	19°44.4	6.6	56.2
2	213°41.0	-9°27.3	345°00.3	10.2	19°51.0	6.5	56.2
3	228°41.1	-9°28.2	359°29.5	10.1	19°57.4	6.4	56.3
4	243°41.2	-9°29.1	13°58.6	10.0	20°03.8	6.3	56.3
5	258°41.4	-9°30.0	28°27.6	10.0	20°10.0	6.2	56.3
6	273°41.5	-9°31.0	42°56.5	9.9	20°16.2	6.1	56.3
7	288°41.6	-9°31.9	57°25.4	9.8	20°22.2	6.0	56.3
8	303°41.7	-9°32.8	71°54.2	9.8	20°28.2	5.9	56.4
9	318°41.9	-9°33.7	86°23.0	9.7	20°34.0	5.8	56.4
10	333°42.0	-9°34.6	100°51.6	9.6	20°39.8	5.7	56.4
11	348°42.1	-9°35.5	115°20.2	9.6	20°45.4	5.6	56.4
12	3°42.2	-9°36.4	129°48.8	9.5	20°51.0	5.5	56.5
13	18°42.4	-9°37.3	144°17.3	9.4	20°56.4	5.4	56.5
14	33°42.5	-9°38.2	158°45.7	9.4	21°01.7	5.3	56.5
15	48°42.6	-9°39.1	173°14.0	9.3	21°06.9	5.2	56.5
16	63°42.7	-9°40.0	187°42.3	9.2	21°12.0	5.0	56.6
17	78°42.8	-9°40.9	202°10.5	9.2	21°17.0	4.9	56.6
18	93°43.0	-9°41.9	216°38.6	9.1	21°21.9	4.8	56.6
19	108°43.1	-9°42.8	231°06.7	9.0	21°26.7	4.7	56.6
20	123°43.2	-9°43.7	245°34.7	9.0	21°31.3	4.6	56.7
21	138°43.3	-9°44.6	260°02.7	8.9	21°35.8	4.5	56.7
22	153°43.4	-9°45.5	274°30.6	8.9	21°40.3	4.4	56.7
23	168°43.6	-9°46.4	288°58.4	8.8	21°44.6	4.2	56.7
	SD.=16.0	d=-0.9			S.D.=15.3		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:02	06:21	07:32	15:57	17:08	18:26
70	05:05	06:16	07:20	16:09	17:13	18:23
68	05:08	06:12	07:10	16:19	17:17	18:21
66	05:09	06:09	07:02	16:28	17:20	18:20
64	05:11	06:06	06:55	16:35	17:24	18:18
62	05:12	06:03	06:49	16:41	17:26	18:17
60	05:13	06:01	06:43	16:46	17:29	18:17
58	05:13	05:59	06:39	16:51	17:31	18:16
56	05:14	05:57	06:35	16:55	17:33	18:16
54	05:14	05:55	06:31	16:59	17:35	18:16
52	05:14	05:53	06:27	17:02	17:37	18:16
50	05:14	05:52	06:24	17:06	17:38	18:16
45	05:14	05:48	06:18	17:12	17:42	18:16
40	05:13	05:45	06:12	17:18	17:45	18:17
35	05:12	05:42	06:07	17:23	17:49	18:18
30	05:11	05:39	06:03	17:27	17:52	18:19
20	05:07	05:33	05:55	17:35	17:57	18:23
10	05:03	05:27	05:49	17:42	18:03	18:28
0	04:57	05:21	05:42	17:49	18:10	18:34
-10	04:49	05:14	05:36	17:55	18:17	18:42
-20	04:40	05:06	05:28	18:03	18:25	18:51
-30	04:27	04:56	05:20	18:11	18:36	19:04
-35	04:19	04:49	05:15	18:16	18:42	19:13
-40	04:09	04:42	05:10	18:22	18:49	19:23
-45	03:56	04:33	05:04	18:28	18:59	19:36
-50	03:40	04:22	04:56	18:36	19:10	19:52
-52	03:33	04:17	04:52	18:40	19:15	19:60
-54	03:24	04:11	04:48	18:44	19:21	20:09
-56	03:14	04:04	04:44	18:48	19:28	20:19
-58	03:02	03:57	04:39	18:53	19:36	20:31
-60	02:48	03:48	04:34	18:59	19:45	20:45

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
72	16:05	–:–	–:–	11:14	–:–	–:–
70	16:39	16:10	–:–	10:42	12:51	–:–
68	17:03	16:54	16:38	10:19	12:08	14:10
66	17:22	17:24	17:30	10:01	11:39	13:19
64	17:38	17:46	18:02	09:46	11:17	12:47
62	17:51	18:04	18:26	09:34	10:60	12:23
60	18:02	18:19	18:45	09:24	10:45	12:05
58	18:11	18:32	19:01	09:15	10:33	11:49
56	18:20	18:43	19:15	09:07	10:22	11:36
54	18:27	18:53	19:26	09:01	10:13	11:25
52	18:34	19:02	19:37	08:54	10:05	11:14
50	18:40	19:10	19:46	08:49	09:57	11:05
45	18:53	19:26	20:06	08:37	09:42	10:46
40	19:04	19:40	20:22	08:27	09:29	10:31
35	19:14	19:52	20:35	08:18	09:18	10:18
30	19:22	20:02	20:47	08:11	09:08	10:07
20	19:36	20:20	21:07	07:58	08:52	09:47
10	19:49	20:35	21:25	07:47	08:37	09:30
0	20:01	20:50	21:42	07:37	08:24	09:14
-10	20:13	21:05	21:59	07:26	08:11	08:59
-20	20:26	21:20	22:16	07:15	07:57	08:42
-30	20:40	21:38	22:37	07:03	07:40	08:23
-35	20:49	21:49	22:49	06:55	07:31	08:11
-40	20:59	22:01	23:03	06:47	07:20	07:59
-45	21:10	22:16	23:20	06:38	07:08	07:44
-50	21:25	22:33	23:40	06:26	06:53	07:25
-52	21:31	22:42	23:50	06:21	06:45	07:16
-54	21:39	22:51	–:–	06:15	06:38	07:07
-56	21:47	23:02	–:–	06:08	06:29	06:56
-58	21:56	23:14	–:–	06:01	06:19	06:43
-60	22:07	23:28	–:–	05:53	06:08	06:28

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
16	14:18	14:24	11:45	01:25	13:48	18(93%)
17	14:30	14:37	11:45	02:12	14:36	19(88%)
18	14:43	14:49	11:45	03:02	15:28	20(80%)

October 19, 20 ,21 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	27°10.8	166°45.6	-15°25.7	198°02.2	-2°57.8	126°58.6	-22°54.6	101°16.1	-22°28.7
1	42°13.2	181°45.0	-15°26.7	213°03.2	-2°58.4	142°00.6	-22°54.6	116°18.5	-22°28.7
2	57°15.7	196°44.5	-15°27.8	228°04.2	-2°59.1	157°02.6	-22°54.6	131°20.8	-22°28.7
3	72°18.1	211°43.9	-15°28.8	243°05.2	-2°59.7	172°04.6	-22°54.7	146°23.1	-22°28.6
4	87°20.6	226°43.3	-15°29.9	258°06.2	-3°00.4	187°06.6	-22°54.7	161°25.5	-22°28.6
5	102°23.1	241°42.7	-15°30.9	273°07.1	-3°01.0	202°08.6	-22°54.7	176°27.8	-22°28.6
6	117°25.5	256°42.1	-15°31.9	288°08.1	-3°01.7	217°10.6	-22°54.8	191°30.1	-22°28.6
7	132°28.0	271°41.6	-15°33.0	303°09.1	-3°02.3	232°12.6	-22°54.8	206°32.5	-22°28.6
8	147°30.5	286°41.0	-15°34.0	318°10.1	-3°03.0	247°14.6	-22°54.8	221°34.8	-22°28.6
9	162°32.9	301°40.4	-15°35.0	333°11.0	-3°03.6	262°16.6	-22°54.9	236°37.1	-22°28.6
10	177°35.4	316°39.8	-15°36.1	348°12.0	-3°04.3	277°18.6	-22°54.9	251°39.5	-22°28.6
11	192°37.9	331°39.2	-15°37.1	3°13.0	-3°04.9	292°20.6	-22°54.9	266°41.8	-22°28.6
12	207°40.3	346°38.7	-15°38.1	18°14.0	-3°05.6	307°22.6	-22°55.0	281°44.1	-22°28.6
13	222°42.8	1°38.1	-15°39.2	33°15.0	-3°06.2	322°24.6	-22°55.0	296°46.4	-22°28.5
14	237°45.3	16°37.5	-15°40.2	48°15.9	-3°06.8	337°26.6	-22°55.0	311°48.8	-22°28.5
15	252°47.7	31°36.9	-15°41.2	63°16.9	-3°07.5	352°28.6	-22°55.1	326°51.1	-22°28.5
16	267°50.2	46°36.3	-15°42.2	78°17.9	-3°08.1	7°30.6	-22°55.1	341°53.4	-22°28.5
17	282°52.6	61°35.8	-15°43.3	93°18.9	-3°08.8	22°32.5	-22°55.1	356°55.8	-22°28.5
18	297°55.1	76°35.2	-15°44.3	108°19.8	-3°09.4	37°34.5	-22°55.2	11°58.1	-22°28.5
19	312°57.6	91°34.6	-15°45.3	123°20.8	-3°10.1	52°36.5	-22°55.2	27°00.4	-22°28.5
20	328°00.0	106°34.0	-15°46.4	138°21.8	-3°10.7	67°38.5	-22°55.3	42°02.7	-22°28.5
21	343°02.5	121°33.4	-15°47.4	153°22.8	-3°11.4	82°40.5	-22°55.3	57°05.1	-22°28.5
22	358°05.0	136°32.8	-15°48.4	168°23.8	-3°12.0	97°42.5	-22°55.3	72°07.4	-22°28.5
23	13°07.4	151°32.2	-15°49.4	183°24.7	-3°12.7	112°44.5	-22°55.4	87°09.7	-22°28.5
Mer.pass.:22:07		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	28°09.9	166°31.7	-15°50.4	198°25.7	-3°13.3	127°46.5	-22°55.4	102°12.1	-22°28.4
1	43°12.4	181°31.1	-15°51.5	213°26.7	-3°14.0	142°48.5	-22°55.4	117°14.4	-22°28.4
2	58°14.8	196°30.5	-15°52.5	228°27.7	-3°14.6	157°50.5	-22°55.5	132°16.7	-22°28.4
3	73°17.3	211°29.9	-15°53.5	243°28.6	-3°15.3	172°52.5	-22°55.5	147°19.0	-22°28.4
4	88°19.8	226°29.3	-15°54.5	258°29.6	-3°15.9	187°54.5	-22°55.5	162°21.4	-22°28.4
5	103°22.2	241°28.7	-15°55.6	273°30.6	-3°16.5	202°56.5	-22°55.6	177°23.7	-22°28.4
6	118°24.7	256°28.1	-15°56.6	288°31.6	-3°17.2	217°58.5	-22°55.6	192°26.0	-22°28.4
7	133°27.1	271°27.5	-15°57.6	303°32.5	-3°17.8	233°00.5	-22°55.6	207°28.4	-22°28.4
8	148°29.6	286°26.9	-15°58.6	318°33.5	-3°18.5	248°02.5	-22°55.7	222°30.7	-22°28.4
9	163°32.1	301°26.3	-15°59.6	333°34.5	-3°19.1	263°04.4	-22°55.7	237°33.0	-22°28.3
10	178°34.5	316°25.8	-16°00.6	348°35.5	-3°19.8	278°06.4	-22°55.7	252°35.3	-22°28.3
11	193°37.0	331°25.2	-16°01.7	3°36.4	-3°20.4	293°08.4	-22°55.8	267°37.7	-22°28.3
12	208°39.5	346°24.6	-16°02.7	18°37.4	-3°21.1	308°10.4	-22°55.8	282°40.0	-22°28.3
13	223°41.9	1°24.0	-16°03.7	33°38.4	-3°21.7	323°12.4	-22°55.8	297°42.3	-22°28.3
14	238°44.4	16°23.4	-16°04.7	48°39.4	-3°22.4	338°14.4	-22°55.9	312°44.6	-22°28.3
15	253°46.9	31°22.8	-16°05.7	63°40.3	-3°23.0	353°16.4	-22°55.9	327°47.0	-22°28.3
16	268°49.3	46°22.2	-16°06.7	78°41.3	-3°23.7	8°18.4	-22°55.9	342°49.3	-22°28.3
17	283°51.8	61°21.6	-16°07.7	93°42.3	-3°24.3	23°20.4	-22°56.0	357°51.6	-22°28.3
18	298°54.3	76°21.0	-16°08.8	108°43.3	-3°24.9	38°22.4	-22°56.0	12°53.9	-22°28.3
19	313°56.7	91°20.4	-16°09.8	123°44.3	-3°25.6	53°24.4	-22°56.0	27°56.3	-22°28.2
20	328°59.2	106°19.8	-16°10.8	138°45.2	-3°26.2	68°26.4	-22°56.1	42°58.6	-22°28.2
21	344°01.6	121°19.2	-16°11.8	153°46.2	-3°26.9	83°28.3	-22°56.1	58°00.9	-22°28.2
22	359°04.1	136°18.6	-16°12.8	168°47.2	-3°27.5	98°30.3	-22°56.1	73°03.2	-22°28.2
23	14°06.6	151°18.0	-16°13.8	183°48.2	-3°28.2	113°32.3	-22°56.2	88°05.6	-22°28.2
Mer.pass.:22:03		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	29°09.0	166°17.4	-16°14.8	198°49.1	-3°28.8	128°34.3	-22°56.2	103°07.9	-22°28.2
1	44°11.5	181°16.8	-16°15.8	213°50.1	-3°29.5	143°36.3	-22°56.2	118°10.2	-22°28.2
2	59°14.0	196°16.2	-16°16.8	228°51.1	-3°30.1	158°38.3	-22°56.3	133°12.5	-22°28.2
3	74°16.4	211°15.6	-16°17.8	243°52.1	-3°30.8	173°40.3	-22°56.3	148°14.9	-22°28.2
4	89°18.9	226°15.0	-16°18.8	258°53.0	-3°31.4	188°42.3	-22°56.3	163°17.2	-22°28.2
5	104°21.4	241°14.4	-16°19.8	273°54.0	-3°32.1	203°44.3	-22°56.4	178°19.5	-22°28.1
6	119°23.8	256°13.8	-16°20.8	288°55.0	-3°32.7	218°46.2	-22°56.4	193°21.8	-22°28.1
7	134°26.3	271°13.2	-16°21.8	303°56.0	-3°33.3	233°48.2	-22°56.4	208°24.1	-22°28.1
8	149°28.7	286°12.6	-16°22.8	318°56.9	-3°34.0	248°50.2	-22°56.5	223°26.5	-22°28.1
9	164°31.2	301°12.0	-16°23.8	333°57.9	-3°34.6	263°52.2	-22°56.5	238°28.8	-22°28.1
10	179°33.7	316°11.4	-16°24.8	348°58.9	-3°35.3	278°54.2	-22°56.5	253°31.1	-22°28.1
11	194°36.1	331°10.8	-16°25.8	3°59.9	-3°35.9	293°56.2	-22°56.6	268°33.4	-22°28.1
12	209°38.6	346°10.2	-16°26.8	19°00.8	-3°36.6	308°58.2	-22°56.6	283°35.8	-22°28.1
13	224°41.1	1°09.6	-16°27.8	34°01.8	-3°37.2	324°00.2	-22°56.6	298°38.1	-22°28.1
14	239°43.5	16°09.0	-16°28.8	49°02.8	-3°37.9	339°02.1	-22°56.7	313°40.4	-22°28.0
15	254°46.0	31°08.4	-16°29.8	64°03.7	-3°38.5	354°04.1	-22°56.7	328°42.7	-22°28.0
16	269°48.5	46°07.7	-16°30.8	79°04.7	-3°39.2	9°06.1	-22°56.7	343°45.0	-22°28.0
17	284°50.9	61°07.1	-16°31.8	94°05.7	-3°39.8	24°08.1	-22°56.8	358°47.4	-22°28.0
18	299°53.4	76°06.5	-16°32.8	109°06.7	-3°40.4	39°10.1	-22°56.8	13°49.7	-22°28.0
19	314°55.9	91°05.9	-16°33.8	124°07.6	-3°41.1	54°12.1	-22°56.8	28°52.0	-22°28.0
20	329°58.3	106°05.3	-16°34.8	139°08.6	-3°41.7	69°14.1	-22°56.9	43°54.3	-22°28.0
21	345°00.8	121°04.7	-16°35.8	154°09.6	-3°42.4	84°16.0	-22°56.9	58°56.6	-22°28.0
22	0°03.2	136°04.1	-16°36.8	169°10.6	-3°43.0	99°18.0	-22°56.9	73°59.0	-22°28.0
23	15°05.7	151°03.5	-16°37.8	184°11.5	-3°43.7	114°20.0	-22°57.0	89°01.3	-22°27.9
Mer.pass.:21:59		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Stars

Star	SHA	Dec
Alpheratz	357°38.7	29°12.1
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.7
Achernar	335°22.9	-57°08.3
Hamal	327°55.6	23°33.3
Polaris	315°26.8	89°20.7
Akamar	315°14.6	-40°13.5
Menkar	314°10.2	4°10.0
Mirfak	308°33.7	49°55.7
Aldebaran	290°44.2	16°32.9
Rigel	281°07.7	-8°10.7
Capella	280°27.8	46°00.9
Bellatrix	278°27.2	6°22.0
Elnath	278°06.9	28°37.3
Alnilam	275°41.8	-1°11.4
Betelgeuse	270°56.5	7°24.6
Canopus	263°54.0	-52°42.1
Sirius	258°29.7	-16°44.3
Adara	255°09.0	-28°59.8
Procyon	244°55.1	5°10.6
Pollux	243°22.3	27°58.6
Avior	234°16.4	-59°34.0
Suhail	222°49.4	-43°30.4
Miaplacidus	221°39.2	-69°47.5
Alphard	217°52.0	-8°44.5
Regulus	207°39.1	11°52.3
Dubhe	193°46.8	61°38.6
Denebola	182°29.5	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°05.2	-63°12.2
Gacrux	171°56.7	-57°13.1
Alioth	166°17.4	55°51.3
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.1
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.2	74°04.7
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.5	-69°03.8
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.1
Etamin	90°44.4	51°29.6
Kaus Aust.	83°38.2	-34°22.4
Vega	80°36.2	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.1	8°55.4
Peacock	53°12.3	-56°40.4
Deneb	49°28.5	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.1	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	SHA	Mer.pass
Venus	139°34.9	12:53
Mars	170°51.5	10:47
Jupiter	99°47.8	15:30
Saturn	74°05.4	17:12

2019/10/	SHA	Mer.pass
Venus	138°21.8	12:54
Mars	170°15.8	10:46
Jupiter	99°36.6	15:27
Saturn	74°02.2	17:09

2019/10/	SHA	Mer.pass
Venus	137°08.4	12:55
Mars	169°40.1	10:44
Jupiter	99°25.3	15:24
Saturn	73°58.8	17:05

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun GHA	Sun Dec	Moon GHA	ν	Moon Dec	d	HP
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°43.7	-9°47.3	303°26.2	8.7	21°48.8	4.1	56.8
1	198°43.8	-9°48.2	317°53.9	8.7	21°52.8	4.0	56.8
2	213°43.9	-9°49.1	332°21.5	8.6	21°56.8	3.9	56.8
3	228°44.0	-9°50.0	346°49.1	8.6	22°00.6	3.8	56.8
4	243°44.2	-9°50.9	1°16.6	8.5	22°04.3	3.7	56.9
5	258°44.3	-9°51.8	15°44.1	8.4	22°07.9	3.5	56.9
6	273°44.4	-9°52.7	30°11.5	8.4	22°11.4	3.4	56.9
7	288°44.5	-9°53.6	44°38.8	8.3	22°14.8	3.3	56.9
8	303°44.6	-9°54.5	59°06.1	8.3	22°18.0	3.2	57.0
9	318°44.7	-9°55.4	73°33.4	8.2	22°21.1	3.0	57.0
10	333°44.9	-9°56.3	88°00.5	8.2	22°24.1	2.9	57.0
11	348°45.0	-9°57.2	102°27.7	8.1	22°26.9	2.8	57.0
12	3°45.1	-9°58.1	116°54.7	8.0	22°29.6	2.7	57.1
13	18°45.2	-9°59.0	131°21.8	8.0	22°32.2	2.5	57.1
14	33°45.3	-9°59.9	145°48.7	7.9	22°34.7	2.4	57.1
15	48°45.4	-10°00.8	160°15.7	7.9	22°37.1	2.3	57.1
16	63°45.6	-10°01.7	174°42.5	7.8	22°39.3	2.2	57.2
17	78°45.7	-10°02.6	189°09.3	7.8	22°41.4	2.0	57.2
18	93°45.8	-10°03.6	203°36.1	7.7	22°43.3	1.9	57.2
19	108°45.9	-10°04.5	218°02.8	7.7	22°45.2	1.8	57.2
20	123°46.0	-10°05.4	232°29.5	7.7	22°46.9	1.6	57.3
21	138°46.1	-10°06.3	246°56.1	7.6	22°48.4	1.5	57.3
22	153°46.2	-10°07.2	261°22.7	7.6	22°49.9	1.4	57.3
23	168°46.3	-10°08.1	275°49.3	7.5	22°51.2	1.2	57.3
	SD.=16.1	d=-0.9			S.D.=15.5		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°46.5	-10°09.0	290°15.8	7.5	22°52.3	1.1	57.4
1	198°46.6	-10°09.9	304°42.2	7.4	22°53.4	1.0	57.4
2	213°46.7	-10°10.8	319°08.6	7.4	22°54.3	0.8	57.4
3	228°46.8	-10°11.6	333°35.0	7.4	22°55.0	0.7	57.5
4	243°46.9	-10°12.5	348°01.4	7.3	22°55.7	0.6	57.5
5	258°47.0	-10°13.4	2°27.7	7.3	22°56.2	0.4	57.5
6	273°47.1	-10°14.3	16°53.9	7.2	22°56.5	0.3	57.5
7	288°47.2	-10°15.2	31°20.1	7.2	22°56.7	0.2	57.6
8	303°47.4	-10°16.1	45°46.3	7.2	22°56.8	0.0	57.6
9	318°47.5	-10°17.0	60°12.5	7.1	22°56.8	-0.1	57.6
10	333°47.6	-10°17.9	74°38.6	7.1	22°56.6	-0.3	57.6
11	348°47.7	-10°18.8	89°04.7	7.1	22°56.3	-0.4	57.7
12	3°47.8	-10°19.7	103°30.8	7.1	22°55.8	-0.5	57.7
13	18°47.9	-10°20.6	117°56.8	7.0	22°55.2	-0.7	57.7
14	33°48.0	-10°21.5	132°22.8	7.0	22°54.4	-0.8	57.8
15	48°48.1	-10°22.4	146°48.8	7.0	22°53.6	-1.0	57.8
16	63°48.2	-10°23.3	161°14.8	6.9	22°52.5	-1.1	57.8
17	78°48.3	-10°24.2	175°40.7	6.9	22°51.4	-1.2	57.8
18	93°48.4	-10°25.1	190°06.6	6.9	22°50.1	-1.4	57.9
19	108°48.5	-10°26.0	204°32.5	6.9	22°48.6	-1.5	57.9
20	123°48.7	-10°26.9	218°58.4	6.9	22°47.0	-1.7	57.9
21	138°48.8	-10°27.8	233°24.2	6.8	22°45.3	-1.8	58.0
22	153°48.9	-10°28.7	247°50.1	6.8	22°43.4	-1.9	58.0
23	168°49.0	-10°29.6	262°15.9	6.8	22°41.4	-2.1	58.0
	SD.=16.1	d=-0.9			S.D.=15.7		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°49.1	-10°30.5	276°41.7	6.8	22°39.3	-2.2	58.0
1	198°49.2	-10°31.4	291°07.4	6.8	22°37.0	-2.4	58.1
2	213°49.3	-10°32.3	305°33.2	6.8	22°34.6	-2.5	58.1
3	228°49.4	-10°33.1	319°58.9	6.7	22°32.0	-2.6	58.1
4	243°49.5	-10°34.0	334°24.7	6.7	22°29.3	-2.8	58.2
5	258°49.6	-10°34.9	348°50.4	6.7	22°26.4	-2.9	58.2
6	273°49.7	-10°35.8	3°16.1	6.7	22°23.4	-3.1	58.2
7	288°49.8	-10°36.7	17°41.8	6.7	22°20.3	-3.2	58.2
8	303°49.9	-10°37.6	32°07.5	6.7	22°17.0	-3.3	58.3
9	318°50.0	-10°38.5	46°33.2	6.7	22°13.6	-3.5	58.3
10	333°50.1	-10°39.4	60°58.9	6.7	22°10.0	-3.6	58.3
11	348°50.2	-10°40.3	75°24.6	6.7	22°06.3	-3.8	58.4
12	3°50.3	-10°41.2	89°50.3	6.7	22°02.5	-3.9	58.4
13	18°50.4	-10°42.1	104°16.0	6.7	21°58.5	-4.1	58.4
14	33°50.5	-10°42.9	118°41.6	6.7	21°54.4	-4.2	58.4
15	48°50.6	-10°43.8	133°07.3	6.7	21°50.1	-4.3	58.5
16	63°50.7	-10°44.7	147°33.0	6.7	21°45.7	-4.5	58.5
17	78°50.8	-10°45.6	161°58.7	6.7	21°41.2	-4.6	58.5
18	93°50.9	-10°46.5	176°24.4	6.7	21°36.5	-4.8	58.6
19	108°51.0	-10°47.4	190°50.1	6.7	21°31.7	-4.9	58.6
20	123°51.1	-10°48.3	205°15.8	6.7	21°26.7	-5.0	58.6
21	138°51.2	-10°49.2	219°41.5	6.7	21°21.6	-5.2	58.6
22	153°51.3	-10°50.1	234°07.2	6.7	21°16.4	-5.3	58.7
23	168°51.4	-10°50.9	248°32.9	6.7	21°11.0	-5.4	58.7
	SD.=16.1	d=-0.9			S.D.=15.8		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	05:15	06:34	07:47	15:40	16:54	18:12
70	05:17	06:28	07:33	15:55	17:00	18:11
68	05:18	06:23	07:21	16:07	17:05	18:10
66	05:19	06:18	07:12	16:17	17:10	18:09
64	05:19	06:14	07:04	16:25	17:14	18:09
62	05:19	06:11	06:57	16:32	17:17	18:09
60	05:20	06:08	06:51	16:38	17:21	18:09
58	05:20	06:05	06:46	16:43	17:23	18:09
56	05:20	06:03	06:41	16:48	17:26	18:09
54	05:19	06:00	06:37	16:52	17:28	18:09
52	05:19	05:58	06:33	16:56	17:30	18:10
50	05:19	05:56	06:29	16:60	17:32	18:10
45	05:18	05:52	06:22	17:07	17:37	18:11
40	05:16	05:48	06:15	17:14	17:41	18:13
35	05:15	05:44	06:10	17:19	17:45	18:14
30	05:13	05:41	06:05	17:24	17:49	18:16
20	05:08	05:34	05:56	17:33	17:55	18:21
10	05:03	05:27	05:49	17:41	18:02	18:27
0	04:56	05:20	05:41	17:48	18:09	18:34
-10	04:48	05:13	05:34	17:56	18:17	18:42
-20	04:37	05:04	05:26	18:04	18:26	18:53
-30	04:23	04:52	05:17	18:13	18:38	19:07
-35	04:15	04:46	05:12	18:19	18:45	19:16
-40	04:04	04:37	05:06	18:25	18:53	19:27
-45	03:50	04:28	04:58	18:32	19:03	19:40
-50	03:33	04:16	04:50	18:41	19:15	19:58
-52	03:25	04:10	04:46	18:45	19:21	20:06
-54	03:15	04:03	04:41	18:49	19:28	20:16
-56	03:04	03:56	04:37	18:54	19:35	20:27
-58	02:52	03:48	04:31	19:00	19:44	20:41
-60	02:36	03:38	04:25	19:06	19:53	20:57

Lat.	Moonrise Sat	Moonrise Sun	Moonrise Mon	Moonset Sat	Moonset Sun	Moonset Mon
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	19:15	–:–	–:–	17:22
66	17:49	18:42	20:15	14:52	15:56	16:22
64	18:32	19:27	20:50	14:09	15:10	15:47
62	19:01	19:57	21:15	13:40	14:40	15:22
60	19:24	20:20	21:34	13:18	14:18	15:02
58	19:42	20:38	21:50	12:60	13:59	14:45
56	19:57	20:54	22:04	12:45	13:44	14:31
54	20:10	21:07	22:16	12:32	13:30	14:19
52	20:22	21:18	22:26	12:20	13:19	14:08
50	20:32	21:29	22:36	12:10	13:09	13:59
45	20:53	21:50	22:55	11:49	12:47	13:38
40	21:11	22:07	23:11	11:32	12:29	13:22
35	21:25	22:22	23:25	11:17	12:15	13:08
30	21:38	22:35	23:36	11:05	12:02	12:56
20	21:60	22:56	23:56	10:44	11:40	12:35
10	22:19	23:15	–:–	10:25	11:21	12:17
0	22:36	23:33	–:–	10:08	11:03	12:00
-10	22:54	23:50	–:–	09:50	10:45	11:43
-20	23:13	–:–	00:09	09:32	10:26	11:25
-30	23:35	–:–	00:31	09:11	10:04	11:04
-35	23:48	–:–	00:44	08:58	09:51	10:51
-40	–:–	00:03	00:58	08:44	09:37	10:37
-45	–:–	00:20	01:15	08:27	09:19	10:20
-50	–:–	00:42	01:37	08:06	08:57	09:59
-52	–:–	00:53	01:47	07:56	08:46	09:49
-54	00:01	01:05	01:59	07:45	08:34	09:37
-56	00:14	01:18	02:12	07:32	08:21	09:24
-58	00:28	01:34	02:27	07:17	08:05	09:09
-60	00:45	01:53	02:45	06:59	07:46	08:51

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
19	14:55	15:00	11:45	03:54	16:21	21(71%)
20	15:06	15:11	11:44	04:49	17:17	22(61%)
21	15:16	15:21	11:44	05:46	18:14	23(50%)

October 22, 23 ,24 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	30°08.2	166°02.9	-16°38.7	199°12.5	-3°44.3	129°22.0	-22°57.0	104°03.6	-22°27.9
1	45°10.6	181°02.3	-16°39.7	214°13.5	-3°45.0	144°24.0	-22°57.0	119°05.9	-22°27.9
2	60°13.1	196°01.6	-16°40.7	229°14.5	-3°45.6	159°26.0	-22°57.1	134°08.2	-22°27.9
3	75°15.6	211°01.0	-16°41.7	244°15.4	-3°46.3	174°28.0	-22°57.1	149°10.6	-22°27.9
4	90°18.0	226°00.4	-16°42.7	259°16.4	-3°46.9	189°29.9	-22°57.1	164°12.9	-22°27.9
5	105°20.5	240°59.8	-16°43.7	274°17.4	-3°47.5	204°31.9	-22°57.2	179°15.2	-22°27.9
6	120°23.0	255°59.2	-16°44.7	289°18.4	-3°48.2	219°33.9	-22°57.2	194°17.5	-22°27.9
7	135°25.4	270°58.6	-16°45.6	304°19.3	-3°48.8	234°35.9	-22°57.2	209°19.8	-22°27.9
8	150°27.9	285°57.9	-16°46.6	319°20.3	-3°49.5	249°37.9	-22°57.3	224°22.2	-22°27.8
9	165°30.4	300°57.3	-16°47.6	334°21.3	-3°50.1	264°39.9	-22°57.3	239°24.5	-22°27.8
10	180°32.8	315°56.7	-16°48.6	349°22.2	-3°50.8	279°41.8	-22°57.3	254°26.8	-22°27.8
11	195°35.3	330°56.1	-16°49.6	4°23.2	-3°51.4	294°43.8	-22°57.4	269°29.1	-22°27.8
12	210°37.7	345°55.5	-16°50.6	19°24.2	-3°52.1	309°45.8	-22°57.4	284°31.4	-22°27.8
13	225°40.2	0°54.9	-16°51.5	34°25.2	-3°52.7	324°47.8	-22°57.4	299°33.8	-22°27.8
14	240°42.7	15°54.2	-16°52.5	49°26.1	-3°53.3	339°49.8	-22°57.5	314°36.1	-22°27.8
15	255°45.1	30°53.6	-16°53.5	64°27.1	-3°54.0	354°51.8	-22°57.5	329°38.4	-22°27.8
16	270°47.6	45°53.0	-16°54.5	79°28.1	-3°54.6	9°53.7	-22°57.5	344°40.7	-22°27.8
17	285°50.1	60°52.4	-16°55.4	94°29.1	-3°55.3	24°55.7	-22°57.6	359°43.0	-22°27.7
18	300°52.5	75°51.8	-16°56.4	109°30.0	-3°55.9	39°57.7	-22°57.6	14°45.3	-22°27.7
19	315°55.0	90°51.1	-16°57.4	124°31.0	-3°56.6	54°59.7	-22°57.6	29°47.7	-22°27.7
20	330°57.5	105°50.5	-16°58.4	139°32.0	-3°57.2	70°01.7	-22°57.7	44°50.0	-22°27.7
21	345°59.9	120°49.9	-16°59.3	154°32.9	-3°57.9	85°03.6	-22°57.7	59°52.3	-22°27.7
22	1°02.4	135°49.3	-17°00.3	169°33.9	-3°58.5	100°05.6	-22°57.7	74°54.6	-22°27.7
23	16°04.9	150°48.6	-17°01.3	184°34.9	-3°59.1	115°07.6	-22°57.8	89°56.9	-22°27.7
Mer.pass.:21:55		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.5	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	31°07.3	165°48.0	-17°02.3	199°35.9	-3°59.8	130°09.6	-22°57.8	104°59.2	-22°27.7
1	46°09.8	180°47.4	-17°03.2	214°36.8	-4°00.4	145°11.6	-22°57.8	120°01.6	-22°27.7
2	61°12.2	195°46.8	-17°04.2	229°37.8	-4°01.1	160°13.5	-22°57.9	135°03.9	-22°27.6
3	76°14.7	210°46.1	-17°05.2	244°38.8	-4°01.7	175°15.5	-22°57.9	150°06.2	-22°27.6
4	91°17.2	225°45.5	-17°06.1	259°39.7	-4°02.4	190°17.5	-22°57.9	165°08.5	-22°27.6
5	106°19.6	240°44.9	-17°07.1	274°40.7	-4°03.0	205°19.5	-22°58.0	180°10.8	-22°27.6
6	121°22.1	255°44.3	-17°08.1	289°41.7	-4°03.7	220°21.5	-22°58.0	195°13.1	-22°27.6
7	136°24.6	270°43.6	-17°09.0	304°42.7	-4°04.3	235°23.4	-22°58.0	210°15.5	-22°27.6
8	151°27.0	285°43.0	-17°10.0	319°43.6	-4°04.9	250°25.4	-22°58.1	225°17.8	-22°27.6
9	166°29.5	300°42.4	-17°11.0	334°44.6	-4°05.6	265°27.4	-22°58.1	240°20.1	-22°27.6
10	181°32.0	315°41.7	-17°11.9	349°45.6	-4°06.2	280°29.4	-22°58.1	255°22.4	-22°27.6
11	196°34.4	330°41.1	-17°12.9	4°46.5	-4°06.9	295°31.4	-22°58.2	270°24.7	-22°27.5
12	211°36.9	345°40.5	-17°13.9	19°47.5	-4°07.5	310°33.3	-22°58.2	285°27.0	-22°27.5
13	226°39.3	0°39.8	-17°14.8	34°48.5	-4°08.2	325°35.3	-22°58.2	300°29.3	-22°27.5
14	241°41.8	15°39.2	-17°15.8	49°49.5	-4°08.8	340°37.3	-22°58.3	315°31.7	-22°27.5
15	256°44.3	30°38.6	-17°16.7	64°50.4	-4°09.5	355°39.3	-22°58.3	330°34.0	-22°27.5
16	271°46.7	45°37.9	-17°17.7	79°51.4	-4°10.1	10°41.2	-22°58.3	345°36.3	-22°27.5
17	286°49.2	60°37.3	-17°18.7	94°52.4	-4°10.7	25°43.2	-22°58.4	0°38.6	-22°27.5
18	301°51.7	75°36.7	-17°19.6	109°53.3	-4°11.4	40°45.2	-22°58.4	15°40.9	-22°27.5
19	316°54.1	90°36.0	-17°20.6	124°54.3	-4°12.0	55°47.2	-22°58.4	30°43.2	-22°27.4
20	331°56.6	105°35.4	-17°21.5	139°55.3	-4°12.7	70°49.2	-22°58.5	45°45.5	-22°27.4
21	346°59.1	120°34.8	-17°22.5	154°56.2	-4°13.3	85°51.1	-22°58.5	60°47.8	-22°27.4
22	2°01.5	135°34.1	-17°23.4	169°57.2	-4°14.0	100°53.1	-22°58.5	75°50.2	-22°27.4
23	17°04.0	150°33.5	-17°24.4	184°58.2	-4°14.6	115°55.1	-22°58.6	90°52.5	-22°27.4
Mer.pass.:21:51		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	32°06.5	165°32.9	-17°25.3	199°59.2	-4°15.2	130°57.1	-22°58.6	105°54.8	-22°27.4
1	47°08.9	180°32.2	-17°26.3	215°00.1	-4°15.9	145°59.0	-22°58.6	120°57.1	-22°27.4
2	62°11.4	195°31.6	-17°27.2	230°01.1	-4°16.5	161°01.0	-22°58.7	135°59.4	-22°27.4
3	77°13.8	210°30.9	-17°28.2	245°02.1	-4°17.2	176°03.0	-22°58.7	151°01.7	-22°27.4
4	92°16.3	225°30.3	-17°29.1	260°03.0	-4°17.8	191°05.0	-22°58.7	166°04.0	-22°27.3
5	107°18.8	240°29.7	-17°30.1	275°04.0	-4°18.5	206°06.9	-22°58.8	181°06.3	-22°27.3
6	122°21.2	255°29.0	-17°31.0	290°05.0	-4°19.1	221°08.9	-22°58.8	196°08.7	-22°27.3
7	137°23.7	270°28.4	-17°32.0	305°05.9	-4°19.7	236°10.9	-22°58.8	211°11.0	-22°27.3
8	152°26.2	285°27.7	-17°32.9	320°06.9	-4°20.4	251°12.9	-22°58.9	226°13.3	-22°27.3
9	167°28.6	300°27.1	-17°33.9	335°07.9	-4°21.0	266°14.8	-22°58.9	241°15.6	-22°27.3
10	182°31.1	315°26.5	-17°34.8	350°08.9	-4°21.7	281°16.8	-22°58.9	256°17.9	-22°27.3
11	197°33.6	330°25.8	-17°35.8	5°09.8	-4°22.3	296°18.8	-22°59.0	271°20.2	-22°27.3
12	212°36.0	345°25.2	-17°36.7	20°10.8	-4°23.0	311°20.8	-22°59.0	286°22.5	-22°27.2
13	227°38.5	0°24.5	-17°37.7	35°11.8	-4°23.6	326°22.7	-22°59.0	301°24.8	-22°27.2
14	242°41.0	15°23.9	-17°38.6	50°12.7	-4°24.2	341°24.7	-22°59.1	316°27.1	-22°27.2
15	257°43.4	30°23.2	-17°39.5	65°13.7	-4°24.9	356°26.7	-22°59.1	331°29.4	-22°27.2
16	272°45.9	45°22.6	-17°40.5	80°14.7	-4°25.5	11°28.7	-22°59.1	346°31.8	-22°27.2
17	287°48.3	60°21.9	-17°41.4	95°15.6	-4°26.2	26°30.6	-22°59.2	1°34.1	-22°27.2
18	302°50.8	75°21.3	-17°42.4	110°16.6	-4°26.8	41°32.6	-22°59.2	16°36.4	-22°27.2
19	317°53.3	90°20.7	-17°43.3	125°17.6	-4°27.5	56°34.6	-22°59.2	31°38.7	-22°27.2
20	332°55.7	105°20.0	-17°44.2	140°18.5	-4°28.1	71°36.5	-22°59.3	46°41.0	-22°27.1
21	347°58.2	120°19.4	-17°45.2	155°19.5	-4°28.7	86°38.5	-22°59.3	61°43.3	-22°27.1
22	3°00.7	135°18.7	-17°46.1	170°20.5	-4°29.4	101°40.5	-22°59.3	76°45.6	-22°27.1
23	18°03.1	150°18.1	-17°47.0	185°21.4	-4°30.0	116°42.5	-22°59.4	91°47.9	-22°27.1
Mer.pass.:21:47		v-0.6 d-1.0 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.7	29°12.1
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.7
Achernar	335°22.9	-57°08.3
Hamal	327°55.5	23°33.3
Polaris	315°26.2	89°20.7
Akamar	315°14.6	-40°13.5
Menkar	314°10.2	4°10.0
Mirfak	308°33.7	49°55.7
Aldebaran	290°44.1	16°32.9
Rigel	281°07.7	-8°10.7
Capella	280°27.7	46°00.9
Bellatrix	278°27.1	6°22.0
Elnath	278°06.9	28°37.3
Alnilam	275°41.8	-1°11.4
Betelgeuse	270°56.4	7°24.6
Canopus	263°54.0	-52°42.2
Sirius	258°29.7	-16°44.3
Adara	255°09.0	-28°59.8
Procyon	244°55.1	5°10.6
Pollux	243°22.3	27°58.6
Avior	234°16.3	-59°34.0
Suhail	222°49.4	-43°30.4
Miaplacidus	221°39.1	-69°47.5
Alphard	217°51.9	-8°44.5
Regulus	207°39.0	11°52.3
Dubhe	193°46.8	61°38.6
Denebola	182°29.4	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°05.2	-63°12.2
Gacrux	171°56.7	-57°13.1
Alioth	166°17.4	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.1
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.2	74°04.7
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.6	-69°03.8
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.1
Etamin	90°44.4	51°29.5
Kaus Aust.	83°38.2	-34°22.4
Vega	80°36.2	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.1	8°55.4
Peacock	53°12.4	-56°40.4
Deneb	49°28.5	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.1	-46°52.0
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	SHA	Mer.pass
Venus	135°54.7	12:56
Mars	169°04.3	10:42
Jupiter	99°13.8	15:21
Saturn	73°55.4	17:01

2019/10/	SHA	Mer.pass
Venus	134°40.7	12:57
Mars	168°28.5	10:41
Jupiter	99°02.3	15:17
Saturn	73°51.9	16:57

2019/10/	SHA	Mer.pass
Venus	133°26.4	12:58
Mars	167°52.7	10:39
Jupiter	98°50.6	15:14
Saturn	73°48.3	16:54

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°51.5	-10°51.8	262°58.6	6.7	21°05.5	-5.6	58.7
1	198°51.6	-10°52.7	277°24.3	6.7	20°59.8	-5.7	58.8
2	213°51.7	-10°53.6	291°50.1	6.8	20°54.0	-5.9	58.8
3	228°51.8	-10°54.5	306°15.8	6.8	20°48.1	-6.0	58.8
4	243°51.9	-10°55.4	320°41.6	6.8	20°42.0	-6.1	58.8
5	258°52.0	-10°56.3	335°07.4	6.8	20°35.8	-6.3	58.9
6	273°52.1	-10°57.1	349°33.2	6.8	20°29.5	-6.4	58.9
7	288°52.2	-10°58.0	3°59.0	6.8	20°23.0	-6.5	58.9
8	303°52.3	-10°58.9	18°24.8	6.8	20°16.4	-6.7	59.0
9	318°52.4	-10°59.8	32°50.7	6.9	20°09.7	-6.8	59.0
10	333°52.5	-11°00.7	47°16.5	6.9	20°02.8	-6.9	59.0
11	348°52.6	-11°01.6	61°42.4	6.9	19°55.8	-7.1	59.0
12	3°52.7	-11°02.4	76°08.3	6.9	19°48.7	-7.2	59.1
13	18°52.8	-11°03.3	90°34.2	6.9	19°41.4	-7.3	59.1
14	33°52.9	-11°04.2	105°00.2	6.9	19°34.0	-7.5	59.1
15	48°53.0	-11°05.1	119°26.1	7.0	19°26.5	-7.6	59.1
16	63°53.1	-11°06.0	133°52.1	7.0	19°18.9	-7.7	59.2
17	78°53.2	-11°06.9	148°18.1	7.0	19°11.1	-7.8	59.2
18	93°53.3	-11°07.7	162°44.1	7.0	19°03.2	-8.0	59.2
19	108°53.3	-11°08.6	177°10.2	7.1	18°55.1	-8.1	59.3
20	123°53.4	-11°09.5	191°36.3	7.1	18°47.0	-8.2	59.3
21	138°53.5	-11°10.4	206°02.4	7.1	18°38.7	-8.3	59.3
22	153°53.6	-11°11.3	220°28.5	7.1	18°30.3	-8.5	59.3
23	168°53.7	-11°12.1	234°54.6	7.2	18°21.7	-8.6	59.4
	SD.=16.1	d=-0.9			S.D.=16.0		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°53.8	-11°13.0	249°20.8	7.2	18°13.1	-8.7	59.4
1	198°53.9	-11°13.9	263°47.0	7.2	18°04.3	-8.8	59.4
2	213°54.0	-11°14.8	278°13.2	7.2	17°55.4	-9.0	59.4
3	228°54.1	-11°15.7	292°39.5	7.3	17°46.4	-9.1	59.5
4	243°54.2	-11°16.5	307°05.8	7.3	17°37.3	-9.2	59.5
5	258°54.3	-11°17.4	321°32.1	7.3	17°28.0	-9.3	59.5
6	273°54.4	-11°18.3	335°58.4	7.4	17°18.6	-9.4	59.5
7	288°54.4	-11°19.2	350°24.8	7.4	17°09.1	-9.6	59.6
8	303°54.5	-11°20.1	4°51.2	7.4	16°59.5	-9.7	59.6
9	318°54.6	-11°20.9	19°17.6	7.4	16°49.8	-9.8	59.6
10	333°54.7	-11°21.8	33°44.1	7.5	16°40.0	-9.9	59.6
11	348°54.8	-11°22.7	48°10.6	7.5	16°30.0	-10.0	59.7
12	3°54.9	-11°23.6	62°37.1	7.5	16°19.9	-10.1	59.7
13	18°55.0	-11°24.4	77°03.6	7.6	16°09.8	-10.2	59.7
14	33°55.1	-11°25.3	91°30.2	7.6	15°59.5	-10.3	59.7
15	48°55.1	-11°26.2	105°56.8	7.6	15°49.1	-10.4	59.8
16	63°55.2	-11°27.1	120°23.5	7.7	15°38.6	-10.5	59.8
17	78°55.3	-11°27.9	134°50.1	7.7	15°28.0	-10.7	59.8
18	93°55.4	-11°28.8	149°16.8	7.7	15°17.3	-10.8	59.8
19	108°55.5	-11°29.7	163°43.6	7.7	15°06.5	-10.9	59.9
20	123°55.6	-11°30.6	178°10.3	7.8	14°55.6	-11.0	59.9
21	138°55.7	-11°31.4	192°37.1	7.8	14°44.6	-11.1	59.9
22	153°55.7	-11°32.3	207°04.0	7.8	14°33.5	-11.2	59.9
23	168°55.8	-11°33.2	221°30.8	7.9	14°22.2	-11.3	60.0
	SD.=16.1	d=-0.9			S.D.=16.2		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°55.9	-11°34.1	235°57.7	7.9	14°10.9	-11.4	60.0
1	198°56.0	-11°34.9	250°24.6	7.9	13°59.5	-11.5	60.0
2	213°56.1	-11°35.8	264°51.6	8.0	13°48.0	-11.6	60.0
3	228°56.2	-11°36.7	279°18.6	8.0	13°36.4	-11.6	60.0
4	243°56.2	-11°37.6	293°45.6	8.0	13°24.7	-11.7	60.1
5	258°56.3	-11°38.4	308°12.6	8.1	13°12.9	-11.8	60.1
6	273°56.4	-11°39.3	322°39.7	8.1	13°01.1	-11.9	60.1
7	288°56.5	-11°40.2	337°06.8	8.1	12°49.1	-12.0	60.1
8	303°56.6	-11°41.0	351°33.9	8.1	12°37.1	-12.1	60.1
9	318°56.7	-11°41.9	6°01.1	8.2	12°24.9	-12.2	60.2
10	333°56.7	-11°42.8	20°28.3	8.2	12°12.7	-12.3	60.2
11	348°56.8	-11°43.6	34°55.5	8.2	12°00.4	-12.3	60.2
12	3°56.9	-11°44.5	49°22.8	8.3	11°48.0	-12.4	60.2
13	18°57.0	-11°45.4	63°50.1	8.3	11°35.5	-12.5	60.2
14	33°57.1	-11°46.3	78°17.4	8.3	11°23.0	-12.6	60.3
15	48°57.1	-11°47.1	92°44.7	8.4	11°10.4	-12.7	60.3
16	63°57.2	-11°48.0	107°12.1	8.4	10°57.7	-12.7	60.3
17	78°57.3	-11°48.9	121°39.5	8.4	10°44.9	-12.8	60.3
18	93°57.4	-11°49.7	136°06.9	8.4	10°32.0	-12.9	60.3
19	108°57.5	-11°50.6	150°34.3	8.5	10°19.1	-13.0	60.3
20	123°57.5	-11°51.5	165°01.8	8.5	10°06.1	-13.0	60.4
21	138°57.6	-11°52.3	179°29.3	8.5	9°53.0	-13.1	60.4
22	153°57.7	-11°53.2	193°56.8	8.5	9°39.9	-13.2	60.4
23	168°57.8	-11°54.1	208°24.4	8.6	9°26.7	-13.2	60.4
	SD.=16.1	d=-0.9			S.D.=16.4		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	05:28	06:47	08:03	15:24	16:40	17:58
70	05:28	06:39	07:46	15:41	16:47	17:59
68	05:28	06:33	07:33	15:54	16:54	17:59
66	05:28	06:28	07:22	16:05	16:60	17:59
64	05:27	06:23	07:13	16:15	17:05	17:60
62	05:27	06:19	07:05	16:22	17:09	18:00
60	05:26	06:15	06:58	16:29	17:13	18:01
58	05:26	06:12	06:52	16:35	17:16	18:02
56	05:25	06:09	06:47	16:41	17:19	18:02
54	05:25	06:06	06:42	16:45	17:22	18:03
52	05:24	06:03	06:38	16:50	17:24	18:04
50	05:23	06:01	06:34	16:54	17:27	18:04
45	05:21	05:56	06:26	17:02	17:32	18:07
40	05:19	05:51	06:19	17:10	17:37	18:09
35	05:17	05:47	06:12	17:16	17:42	18:11
30	05:15	05:43	06:07	17:21	17:46	18:14
20	05:09	05:35	05:57	17:31	17:53	18:19
10	05:03	05:28	05:49	17:40	18:01	18:26
0	04:55	05:20	05:41	17:48	18:09	18:33
-10	04:46	05:11	05:33	17:56	18:17	18:43
-20	04:35	05:01	05:24	18:05	18:28	18:54
-30	04:20	04:49	05:14	18:15	18:40	19:09
-35	04:10	04:42	05:08	18:21	18:48	19:19
-40	03:59	04:33	05:01	18:28	18:56	19:31
-45	03:45	04:22	04:53	18:36	19:07	19:45
-50	03:26	04:09	04:44	18:46	19:21	20:04
-52	03:17	04:03	04:39	18:50	19:27	20:13
-54	03:07	03:56	04:35	18:55	19:34	20:24
-56	02:55	03:48	04:29	19:01	19:42	20:36
-58	02:41	03:39	04:23	19:07	19:52	20:51
-60	02:24	03:29	04:16	19:14	20:02	21:08

		Moonrise			**Moonset**	
Lat.	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	22:48	–:–	–:–	17:49	17:13
70	20:47	23:19	–:–	17:50	17:15	16:57
68	21:35	23:42	–:–	17:01	16:51	16:44
66	22:06	23:60	–:–	16:30	16:32	16:33
64	22:29	–:–	00:14	16:06	16:17	16:23
62	22:47	–:–	00:26	15:48	16:04	16:15
60	23:02	–:–	00:36	15:32	15:53	16:08
58	23:14	–:–	00:45	15:19	15:43	16:02
56	23:25	–:–	00:52	15:07	15:35	15:57
54	23:35	–:–	00:59	14:57	15:27	15:52
52	23:43	–:–	01:05	14:48	15:21	15:47
50	23:51	–:–	01:11	14:40	15:14	15:43
45	–:–	00:07	01:23	14:23	15:01	15:34
40	–:–	00:20	01:33	14:09	14:50	15:27
35	–:–	00:32	01:41	13:57	14:41	15:21
30	–:–	00:41	01:48	13:46	14:32	15:15
20	–:–	00:58	02:01	13:28	14:18	15:05
10	00:14	01:13	02:12	13:12	14:05	14:56
0	00:30	01:27	02:22	12:57	13:53	14:48
-10	00:46	01:40	02:32	12:42	13:41	14:40
-20	01:03	01:55	02:43	12:26	13:28	14:31
-30	01:23	02:11	02:56	12:07	13:13	14:20
-35	01:35	02:21	03:03	11:56	13:04	14:14
-40	01:48	02:32	03:11	11:43	12:54	14:07
-45	02:04	02:45	03:20	11:29	12:43	13:59
-50	02:23	03:00	03:32	11:10	12:28	13:50
-52	02:32	03:08	03:37	11:01	12:21	13:45
-54	02:42	03:16	03:42	10:52	12:14	13:40
-56	02:53	03:25	03:49	10:41	12:06	13:35
-58	03:06	03:35	03:56	10:28	11:56	13:28
-60	03:22	03:46	04:04	10:13	11:45	13:21

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
22	15:26	15:31	11:44	06:43	19:11	24(39%)
23	15:35	15:39	11:44	07:39	20:07	25(28%)
24	15:44	15:48	11:44	08:35	21:02	26(19%)

October 25, 26 ,27 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	33°05.6	165°17.4	-17°48.0	200°22.4	-4°30.7	131°44.4	-22°59.4	106°50.2	-22°27.1
1	48°08.1	180°16.8	-17°48.9	215°23.4	-4°31.3	146°46.4	-22°59.4	121°52.5	-22°27.1
2	63°10.5	195°16.1	-17°49.8	230°24.4	-4°32.0	161°48.4	-22°59.5	136°54.8	-22°27.1
3	78°13.0	210°15.5	-17°50.8	245°25.3	-4°32.6	176°50.4	-22°59.5	151°57.2	-22°27.1
4	93°15.4	225°14.8	-17°51.7	260°26.3	-4°33.2	191°52.3	-22°59.5	166°59.5	-22°27.1
5	108°17.9	240°14.1	-17°52.6	275°27.3	-4°33.9	206°54.3	-22°59.5	182°01.8	-22°27.0
6	123°20.4	255°13.5	-17°53.6	290°28.2	-4°34.5	221°56.3	-22°59.6	197°04.1	-22°27.0
7	138°22.8	270°12.8	-17°54.5	305°29.2	-4°35.2	236°58.2	-22°59.6	212°06.4	-22°27.0
8	153°25.3	285°12.2	-17°55.4	320°30.2	-4°35.8	252°00.2	-22°59.6	227°08.7	-22°27.0
9	168°27.8	300°11.5	-17°56.4	335°31.1	-4°36.5	267°02.2	-22°59.7	242°11.0	-22°27.0
10	183°30.2	315°10.9	-17°57.3	350°32.1	-4°37.1	282°04.1	-22°59.7	257°13.3	-22°27.0
11	198°32.7	330°10.2	-17°58.2	5°33.1	-4°37.7	297°06.1	-22°59.7	272°15.6	-22°27.0
12	213°35.2	345°09.6	-17°59.1	20°34.0	-4°38.4	312°08.1	-22°59.8	287°17.9	-22°27.0
13	228°37.6	0°08.9	-18°00.0	35°35.0	-4°39.0	327°10.1	-22°59.8	302°20.2	-22°26.9
14	243°40.1	15°08.2	-18°01.0	50°36.0	-4°39.7	342°12.0	-22°59.8	317°22.5	-22°26.9
15	258°42.6	30°07.6	-18°01.9	65°36.9	-4°40.3	357°14.0	-22°59.9	332°24.8	-22°26.9
16	273°45.0	45°06.9	-18°02.8	80°37.9	-4°40.9	12°16.0	-22°59.9	347°27.1	-22°26.9
17	288°47.5	60°06.3	-18°03.7	95°38.9	-4°41.6	27°17.9	-22°59.9	2°29.4	-22°26.9
18	303°49.9	75°05.6	-18°04.7	110°39.8	-4°42.2	42°19.9	-22°60.0	17°31.8	-22°26.9
19	318°52.4	90°04.9	-18°05.6	125°40.8	-4°42.9	57°21.9	-22°60.0	32°34.1	-22°26.9
20	333°54.9	105°04.3	-18°06.5	140°41.8	-4°43.5	72°23.8	-23°00.0	47°36.4	-22°26.8
21	348°57.3	120°03.6	-18°07.4	155°42.7	-4°44.2	87°25.8	-23°00.1	62°38.7	-22°26.8
22	3°59.8	135°03.0	-18°08.3	170°43.7	-4°44.8	102°27.8	-23°00.1	77°41.0	-22°26.8
23	19°02.3	150°02.3	-18°09.2	185°44.7	-4°45.4	117°29.7	-23°00.1	92°43.3	-22°26.8
Mer.pass.:21:44		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	34°04.7	165°01.6	-18°10.2	200°45.6	-4°46.1	132°31.7	-23°00.2	107°45.6	-22°26.8
1	49°07.2	180°01.0	-18°11.1	215°46.6	-4°46.7	147°33.7	-23°00.2	122°47.9	-22°26.8
2	64°09.7	195°00.3	-18°12.0	230°47.6	-4°47.4	162°35.6	-23°00.2	137°50.2	-22°26.8
3	79°12.1	209°59.6	-18°12.9	245°48.5	-4°48.0	177°37.6	-23°00.3	152°52.5	-22°26.8
4	94°14.6	224°59.0	-18°13.8	260°49.5	-4°48.6	192°39.6	-23°00.3	167°54.8	-22°26.7
5	109°17.0	239°58.3	-18°14.7	275°50.5	-4°49.3	207°41.5	-23°00.3	182°57.1	-22°26.7
6	124°19.5	254°57.6	-18°15.6	290°51.4	-4°49.9	222°43.5	-23°00.4	197°59.4	-22°26.7
7	139°22.0	269°57.0	-18°16.5	305°52.4	-4°50.6	237°45.5	-23°00.4	213°01.7	-22°26.7
8	154°24.4	284°56.3	-18°17.4	320°53.4	-4°51.2	252°47.4	-23°00.4	228°04.0	-22°26.7
9	169°26.9	299°55.6	-18°18.3	335°54.3	-4°51.8	267°49.4	-23°00.4	243°06.3	-22°26.7
10	184°29.4	314°55.0	-18°19.3	350°55.3	-4°52.5	282°51.4	-23°00.5	258°08.6	-22°26.7
11	199°31.8	329°54.3	-18°20.2	5°56.3	-4°53.1	297°53.3	-23°00.5	273°10.9	-22°26.7
12	214°34.3	344°53.6	-18°21.1	20°57.2	-4°53.8	312°55.3	-23°00.5	288°13.2	-22°26.6
13	229°36.8	359°53.0	-18°22.0	35°58.2	-4°54.4	327°57.3	-23°00.6	303°15.5	-22°26.6
14	244°39.2	14°52.3	-18°22.9	50°59.2	-4°55.0	342°59.2	-23°00.6	318°17.8	-22°26.6
15	259°41.7	29°51.6	-18°23.8	66°00.1	-4°55.7	358°01.2	-23°00.6	333°20.1	-22°26.6
16	274°44.2	44°50.9	-18°24.7	81°01.1	-4°56.3	13°03.2	-23°00.7	348°22.4	-22°26.6
17	289°46.6	59°50.3	-18°25.6	96°02.0	-4°57.0	28°05.1	-23°00.7	3°24.7	-22°26.6
18	304°49.1	74°49.6	-18°26.5	111°03.0	-4°57.6	43°07.1	-23°00.7	18°27.0	-22°26.6
19	319°51.5	89°48.9	-18°27.4	126°04.0	-4°58.2	58°09.1	-23°00.8	33°29.3	-22°26.6
20	334°54.0	104°48.3	-18°28.3	141°04.9	-4°58.9	73°11.0	-23°00.8	48°31.6	-22°26.5
21	349°56.5	119°47.6	-18°29.2	156°05.9	-4°59.5	88°13.0	-23°00.8	63°33.9	-22°26.5
22	4°58.9	134°46.9	-18°30.1	171°06.9	-5°00.2	103°14.9	-23°00.9	78°36.2	-22°26.5
23	20°01.4	149°46.2	-18°31.0	186°07.8	-5°00.8	118°16.9	-23°00.9	93°38.5	-22°26.5
Mer.pass.:21:40		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	35°03.9	164°45.6	-18°31.9	201°08.8	-5°01.5	133°18.9	-23°00.9	108°40.8	-22°26.5
1	50°06.3	179°44.9	-18°32.7	216°09.8	-5°02.1	148°20.8	-23°01.0	123°43.1	-22°26.5
2	65°08.8	194°44.2	-18°33.6	231°10.7	-5°02.7	163°22.8	-23°01.0	138°45.5	-22°26.5
3	80°11.3	209°43.5	-18°34.5	246°11.7	-5°03.4	178°24.8	-23°01.0	153°47.8	-22°26.4
4	95°13.7	224°42.8	-18°35.4	261°12.7	-5°04.0	193°26.7	-23°01.0	168°50.1	-22°26.4
5	110°16.2	239°42.2	-18°36.3	276°13.6	-5°04.6	208°28.7	-23°01.1	183°52.4	-22°26.4
6	125°18.6	254°41.5	-18°37.2	291°14.6	-5°05.3	223°30.7	-23°01.1	198°54.7	-22°26.4
7	140°21.1	269°40.8	-18°38.1	306°15.5	-5°05.9	238°32.6	-23°01.1	213°57.0	-22°26.4
8	155°23.6	284°40.1	-18°39.0	321°16.5	-5°06.6	253°34.6	-23°01.2	228°59.3	-22°26.4
9	170°26.0	299°39.4	-18°39.9	336°17.5	-5°07.2	268°36.5	-23°01.2	244°01.5	-22°26.4
10	185°28.5	314°38.8	-18°40.7	351°18.4	-5°07.8	283°38.5	-23°01.2	259°03.8	-22°26.4
11	200°31.0	329°38.1	-18°41.6	6°19.4	-5°08.5	298°40.5	-23°01.3	274°06.1	-22°26.3
12	215°33.4	344°37.4	-18°42.5	21°20.4	-5°09.1	313°42.4	-23°01.3	289°08.4	-22°26.3
13	230°35.9	359°36.7	-18°43.4	36°21.3	-5°09.8	328°44.4	-23°01.3	304°10.7	-22°26.3
14	245°38.4	14°36.0	-18°44.3	51°22.3	-5°10.4	343°46.3	-23°01.4	319°13.0	-22°26.3
15	260°40.8	29°35.3	-18°45.2	66°23.3	-5°11.0	358°48.3	-23°01.4	334°15.3	-22°26.3
16	275°43.3	44°34.7	-18°46.0	81°24.2	-5°11.7	13°50.3	-23°01.4	349°17.6	-22°26.3
17	290°45.8	59°34.0	-18°46.9	96°25.2	-5°12.3	28°52.2	-23°01.5	4°19.9	-22°26.3
18	305°48.2	74°33.3	-18°47.8	111°26.1	-5°13.0	43°54.2	-23°01.5	19°22.2	-22°26.2
19	320°50.7	89°32.6	-18°48.7	126°27.1	-5°13.6	58°56.1	-23°01.5	34°24.5	-22°26.2
20	335°53.1	104°31.9	-18°49.6	141°28.1	-5°14.2	73°58.1	-23°01.5	49°26.8	-22°26.2
21	350°55.6	119°31.2	-18°50.4	156°29.0	-5°14.9	89°00.1	-23°01.6	64°29.1	-22°26.2
22	5°58.1	134°30.5	-18°51.3	171°30.0	-5°15.5	104°02.0	-23°01.6	79°31.4	-22°26.2
23	21°00.5	149°29.8	-18°52.2	186°31.0	-5°16.2	119°04.0	-23°01.6	94°33.7	-22°26.2
Mer.pass.:21:36		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Stars		
	SHA	**Dec**
Alpheratz	357°38.7	29°12.1
Ankaa	353°11.0	-42°12.0
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.7
Achernar	335°22.9	-57°08.3
Hamal	327°55.5	23°33.3
Polaris	315°25.9	89°20.7
Akamar	315°14.6	-40°13.6
Menkar	314°10.2	4°10.0
Mirfak	308°33.7	49°55.7
Aldebaran	290°44.1	16°32.9
Rigel	281°07.6	-8°10.7
Capella	280°27.7	46°00.9
Bellatrix	278°27.1	6°22.0
Elnath	278°06.9	28°37.3
Alnilam	275°41.8	-1°11.4
Betelgeuse	270°56.4	7°24.6
Canopus	263°54.0	-52°42.2
Sirius	258°29.7	-16°44.3
Adara	255°09.0	-28°59.8
Procyon	244°55.1	5°10.6
Pollux	243°22.3	27°58.6
Avior	234°16.3	-59°34.0
Suhail	222°49.4	-43°30.4
Miaplacidus	221°39.1	-69°47.5
Alphard	217°51.9	-8°44.5
Regulus	207°39.0	11°52.3
Dubhe	193°46.8	61°38.6
Denebola	182°29.4	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°05.2	-63°12.2
Gacrux	171°56.6	-57°13.1
Alioth	166°17.4	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.0
Hadar	148°42.4	-60°27.9
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.2	74°04.6
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.6	-69°03.8
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.4	51°29.5
Kaus Aust.	83°38.2	-34°22.4
Vega	80°36.2	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.1	8°55.4
Peacock	53°12.4	-56°40.4
Deneb	49°28.5	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.1	-46°52.1
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	**SHA**	**Mer.pass**
Venus	132°11.8	12:59
Mars	167°16.8	10:38
Jupiter	98°38.8	15:11
Saturn	73°44.6	16:50

2019/10/	**SHA**	**Mer.pass**
Venus	130°56.9	13:00
Mars	166°40.9	10:36
Jupiter	98°27.0	15:08
Saturn	73°40.9	16:46

2019/10/	**SHA**	**Mer.pass**
Venus	129°41.7	13:02
Mars	166°04.9	10:35
Jupiter	98°15.0	15:05
Saturn	73°37.0	16:43

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	183°57.8	-11°54.9	222°52.0	8.6	9°13.4	-13.3	60.4
1	198°57.9	-11°55.8	237°19.6	8.6	9°00.1	-13.4	60.4
2	213°58.0	-11°56.7	251°47.2	8.6	8°46.7	-13.4	60.5
3	228°58.1	-11°57.5	266°14.9	8.7	8°33.3	-13.5	60.5
4	243°58.1	-11°58.4	280°42.5	8.7	8°19.8	-13.5	60.5
5	258°58.2	-11°59.2	295°10.2	8.7	8°06.2	-13.6	60.5
6	273°58.3	-12°00.1	309°37.9	8.7	7°52.6	-13.7	60.5
7	288°58.4	-12°01.0	324°05.7	8.7	7°38.9	-13.7	60.5
8	303°58.4	-12°01.8	338°33.4	8.8	7°25.2	-13.8	60.5
9	318°58.5	-12°02.7	353°01.2	8.8	7°11.4	-13.8	60.5
10	333°58.6	-12°03.6	7°29.0	8.8	6°57.5	-13.9	60.5
11	348°58.7	-12°04.4	21°56.8	8.8	6°43.7	-13.9	60.6
12	3°58.7	-12°05.3	36°24.7	8.8	6°29.7	-14.0	60.6
13	18°58.8	-12°06.1	50°52.5	8.9	6°15.8	-14.0	60.6
14	33°58.9	-12°07.0	65°20.4	8.9	6°01.7	-14.0	60.6
15	48°58.9	-12°07.9	79°48.3	8.9	5°47.7	-14.1	60.6
16	63°59.0	-12°08.7	94°16.2	8.9	5°33.6	-14.1	60.6
17	78°59.1	-12°09.6	108°44.1	8.9	5°19.4	-14.2	60.6
18	93°59.2	-12°10.5	123°12.1	8.9	5°05.3	-14.2	60.6
19	108°59.2	-12°11.3	137°40.0	9.0	4°51.1	-14.2	60.6
20	123°59.3	-12°12.2	152°08.0	9.0	4°36.8	-14.3	60.6
21	138°59.4	-12°13.0	166°36.0	9.0	4°22.5	-14.3	60.6
22	153°59.4	-12°13.9	181°04.0	9.0	4°08.2	-14.3	60.6
23	168°59.5	-12°14.7	195°32.0	9.0	3°53.9	-14.3	60.7
	SD.=16.1	d=-0.9			S.D.=16.5		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	183°59.6	-12°15.6	210°00.0	9.0	3°39.5	-14.4	60.7
1	198°59.6	-12°16.5	224°28.0	9.0	3°25.1	-14.4	60.7
2	213°59.7	-12°17.3	238°56.1	9.0	3°10.7	-14.4	60.7
3	228°59.8	-12°18.2	253°24.1	9.1	2°56.3	-14.4	60.7
4	243°59.9	-12°19.0	267°52.2	9.1	2°41.8	-14.5	60.7
5	258°59.9	-12°19.9	282°20.2	9.1	2°27.4	-14.5	60.7
6	273°60.0	-12°20.7	296°48.3	9.1	2°12.9	-14.5	60.7
7	289°00.1	-12°21.6	311°16.4	9.1	1°58.4	-14.5	60.7
8	304°00.1	-12°22.5	325°44.5	9.1	1°43.9	-14.5	60.7
9	319°00.2	-12°23.3	340°12.6	9.1	1°29.3	-14.5	60.7
10	334°00.3	-12°24.2	354°40.7	9.1	1°14.8	-14.5	60.7
11	349°00.3	-12°25.0	9°08.8	9.1	1°00.2	-14.6	60.7
12	4°00.4	-12°25.9	23°36.9	9.1	0°45.7	-14.6	60.7
13	19°00.4	-12°26.7	38°05.0	9.1	0°31.1	-14.6	60.7
14	34°00.5	-12°27.6	52°33.1	9.1	0°16.5	-14.6	60.7
15	49°00.6	-12°28.4	67°01.2	9.1	0°02.0	-14.6	60.7
16	64°00.6	-12°29.3	81°29.3	9.1	-0°12.6	-14.6	60.7
17	79°00.7	-12°30.1	95°57.4	9.1	-0°27.2	-14.6	60.7
18	94°00.8	-12°31.0	110°25.6	9.1	-0°41.7	-14.6	60.7
19	109°00.8	-12°31.8	124°53.7	9.1	-0°56.3	-14.6	60.7
20	124°00.9	-12°32.7	139°21.8	9.1	-1°10.9	-14.6	60.7
21	139°01.0	-12°33.5	153°49.9	9.1	-1°25.4	-14.5	60.7
22	154°01.0	-12°34.4	168°18.0	9.1	-1°39.9	-14.5	60.7
23	169°01.1	-12°35.3	182°46.1	9.1	-1°54.5	-14.5	60.7
	SD.=16.1	d=-0.9			S.D.=16.5		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	184°01.1	-12°36.1	197°14.2	9.1	-2°09.0	-14.5	60.6
1	199°01.2	-12°37.0	211°42.3	9.1	-2°23.5	-14.5	60.6
2	214°01.3	-12°37.8	226°10.4	9.1	-2°37.9	-14.5	60.6
3	229°01.3	-12°38.6	240°38.5	9.1	-2°52.4	-14.5	60.6
4	244°01.4	-12°39.5	255°06.5	9.1	-3°06.8	-14.4	60.6
5	259°01.4	-12°40.3	269°34.6	9.1	-3°21.3	-14.4	60.6
6	274°01.5	-12°41.2	284°02.7	9.1	-3°35.7	-14.4	60.6
7	289°01.6	-12°42.0	298°30.7	9.0	-3°50.0	-14.4	60.6
8	304°01.6	-12°42.9	312°58.8	9.0	-4°04.4	-14.3	60.6
9	319°01.7	-12°43.7	327°26.8	9.0	-4°18.7	-14.3	60.6
10	334°01.7	-12°44.6	341°54.8	9.0	-4°33.0	-14.3	60.6
11	349°01.8	-12°45.4	356°22.8	9.0	-4°47.2	-14.2	60.5
12	4°01.9	-12°46.3	10°50.8	9.0	-5°01.5	-14.2	60.5
13	19°01.9	-12°47.1	25°18.8	9.0	-5°15.6	-14.2	60.5
14	34°02.0	-12°48.0	39°46.8	9.0	-5°29.8	-14.1	60.5
15	49°02.0	-12°48.8	54°14.7	9.0	-5°43.9	-14.1	60.5
16	64°02.1	-12°49.7	68°42.7	8.9	-5°58.0	-14.1	60.5
17	79°02.1	-12°50.5	83°10.6	8.9	-6°12.0	-14.0	60.5
18	94°02.2	-12°51.3	97°38.5	8.9	-6°26.0	-14.0	60.5
19	109°02.2	-12°52.2	112°06.4	8.9	-6°39.9	-13.9	60.4
20	124°02.3	-12°53.0	126°34.3	8.9	-6°53.8	-13.9	60.4
21	139°02.4	-12°53.9	141°02.2	8.9	-7°07.7	-13.8	60.4
22	154°02.4	-12°54.7	155°30.1	8.8	-7°21.5	-13.8	60.4
23	169°02.5	-12°55.6	169°57.9	8.8	-7°35.2	-13.7	60.4
	SD.=16.1	d=-0.8			S.D.=16.5		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	05:41	07:01	08:19	15:07	16:26	17:45
70	05:39	06:51	08:00	15:26	16:35	17:47
68	05:38	06:43	07:45	15:42	16:43	17:48
66	05:37	06:37	07:32	15:54	16:50	17:50
64	05:36	06:31	07:22	16:05	16:55	17:51
62	05:34	06:26	07:13	16:13	17:00	17:52
60	05:33	06:22	07:06	16:21	17:05	17:53
58	05:32	06:18	06:59	16:28	17:09	17:55
56	05:31	06:15	06:53	16:34	17:12	17:56
54	05:30	06:11	06:48	16:39	17:16	17:57
52	05:29	06:08	06:43	16:44	17:19	17:58
50	05:28	06:06	06:39	16:48	17:21	17:59
45	05:25	05:60	06:30	16:58	17:28	18:02
40	05:22	05:54	06:22	17:06	17:33	18:05
35	05:20	05:49	06:15	17:12	17:38	18:08
30	05:17	05:45	06:09	17:18	17:43	18:11
20	05:10	05:36	05:59	17:29	17:52	18:17
10	05:03	05:28	05:49	17:38	17:60	18:25
0	04:55	05:19	05:41	17:47	18:09	18:33
-10	04:45	05:10	05:32	17:56	18:18	18:43
-20	04:33	04:59	05:22	18:06	18:29	18:56
-30	04:17	04:46	05:11	18:17	18:42	19:12
-35	04:07	04:38	05:05	18:24	18:50	19:22
-40	03:54	04:29	04:57	18:31	19:00	19:35
-45	03:39	04:17	04:49	18:40	19:12	19:50
-50	03:19	04:03	04:38	18:51	19:26	20:10
-52	03:09	03:56	04:33	18:56	19:33	20:20
-54	02:58	03:49	04:28	19:01	19:41	20:32
-56	02:45	03:40	04:22	19:07	19:50	20:45
-58	02:30	03:30	04:15	19:14	19:60	21:01
-60	02:10	03:19	04:08	19:22	20:11	21:21

Lat.	Moonrise Fri	Moonrise Sat	Moonrise Sun	Moonset Fri	Moonset Sat	Moonset Sun
72	01:18	03:35	05:50	16:50	16:29	16:08
70	01:32	03:39	05:44	16:43	16:30	16:16
68	01:44	03:42	05:40	16:37	16:30	16:23
66	01:53	03:45	05:36	16:32	16:30	16:29
64	02:01	03:47	05:33	16:27	16:31	16:34
62	02:07	03:49	05:30	16:24	16:31	16:39
60	02:13	03:51	05:28	16:21	16:31	16:42
58	02:18	03:52	05:26	16:18	16:32	16:46
56	02:22	03:53	05:24	16:15	16:32	16:49
54	02:26	03:54	05:23	16:13	16:32	16:52
52	02:30	03:56	05:21	16:11	16:32	16:54
50	02:33	03:56	05:20	16:09	16:33	16:56
45	02:40	03:59	05:17	16:04	16:33	17:01
40	02:46	04:00	05:15	16:01	16:33	17:06
35	02:51	04:02	05:13	15:58	16:33	17:09
30	02:56	04:03	05:11	15:55	16:34	17:12
20	03:03	04:06	05:08	15:50	16:34	17:18
10	03:10	04:08	05:05	15:46	16:34	17:23
0	03:16	04:10	05:02	15:42	16:35	17:28
-10	03:23	04:11	05:00	15:37	16:35	17:32
-20	03:29	04:14	04:57	15:33	16:35	17:37
-30	03:37	04:16	04:55	15:28	16:35	17:43
-35	03:41	04:17	04:53	15:25	16:35	17:46
-40	03:46	04:19	04:51	15:21	16:36	17:50
-45	03:52	04:21	04:49	15:17	16:36	17:54
-50	03:58	04:23	04:46	15:13	16:36	17:59
-52	04:01	04:24	04:45	15:10	16:36	18:02
-54	04:05	04:25	04:44	15:08	16:36	18:04
-56	04:09	04:26	04:43	15:05	16:36	18:07
-58	04:13	04:27	04:41	15:02	16:36	18:10
-60	04:17	04:29	04:40	14:59	16:36	18:14

Day	Sun Eqn.of Time 00^h	Sun Eqn.of Time 12^h	Sun Mer. Pass	Moon Mer.Pass. Upper	Moon Mer.Pass. Lower	Moon Age
25	15:51	15:55	11:44	09:28	21:55	27(10%)
26	15:58	16:01	11:43	10:22	22:48	28(4%)
27	16:04	16:07	11:43	11:15	23:41	29(1%)

October 28, 29 ,30 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	36°03.0	164°29.2	-18°53.1	201°31.9	-5°16.8	134°05.9	-23°01.7	109°36.0	-22°26.2
1	51°05.5	179°28.5	-18°53.9	216°32.9	-5°17.4	149°07.9	-23°01.7	124°38.3	-22°26.1
2	66°07.9	194°27.8	-18°54.8	231°33.8	-5°18.1	164°09.9	-23°01.7	139°40.6	-22°26.1
3	81°10.4	209°27.1	-18°55.7	246°34.8	-5°18.7	179°11.8	-23°01.8	154°42.9	-22°26.1
4	96°12.9	224°26.4	-18°56.5	261°35.8	-5°19.4	194°13.8	-23°01.8	169°45.2	-22°26.1
5	111°15.3	239°25.7	-18°57.4	276°36.7	-5°20.0	209°15.7	-23°01.8	184°47.5	-22°26.1
6	126°17.8	254°25.0	-18°58.3	291°37.7	-5°20.6	224°17.7	-23°01.9	199°49.8	-22°26.1
7	141°20.3	269°24.3	-18°59.2	306°38.7	-5°21.3	239°19.7	-23°01.9	214°52.1	-22°26.1
8	156°22.7	284°23.6	-19°00.0	321°39.6	-5°21.9	254°21.6	-23°01.9	229°54.4	-22°26.0
9	171°25.2	299°22.9	-19°00.9	336°40.6	-5°22.5	269°23.6	-23°01.9	244°56.7	-22°26.0
10	186°27.6	314°22.2	-19°01.8	351°41.5	-5°23.2	284°25.5	-23°02.0	259°59.0	-22°26.0
11	201°30.1	329°21.5	-19°02.6	6°42.5	-5°23.8	299°27.5	-23°02.0	275°01.3	-22°26.0
12	216°32.6	344°20.8	-19°03.5	21°43.5	-5°24.5	314°29.4	-23°02.0	290°03.6	-22°26.0
13	231°35.0	359°20.1	-19°04.3	36°44.4	-5°25.1	329°31.4	-23°02.1	305°05.9	-22°26.0
14	246°37.5	14°19.5	-19°05.2	51°45.4	-5°25.7	344°33.4	-23°02.1	320°08.2	-22°26.0
15	261°40.0	29°18.8	-19°06.1	66°46.3	-5°26.4	359°35.3	-23°02.1	335°10.5	-22°26.0
16	276°42.4	44°18.1	-19°06.9	81°47.3	-5°27.0	14°37.3	-23°02.2	350°12.8	-22°25.9
17	291°44.9	59°17.4	-19°07.8	96°48.3	-5°27.6	29°39.2	-23°02.2	5°15.1	-22°25.9
18	306°47.4	74°16.7	-19°08.6	111°49.2	-5°28.3	44°41.2	-23°02.2	20°17.3	-22°25.9
19	321°49.8	89°16.0	-19°09.5	126°50.2	-5°28.9	59°43.1	-23°02.3	35°19.6	-22°25.9
20	336°52.3	104°15.3	-19°10.4	141°51.2	-5°29.6	74°45.1	-23°02.3	50°21.9	-22°25.9
21	351°54.7	119°14.6	-19°11.2	156°52.1	-5°30.2	89°47.0	-23°02.3	65°24.2	-22°25.9
22	6°57.2	134°13.9	-19°12.1	171°53.1	-5°30.8	104°49.0	-23°02.3	80°26.5	-22°25.9
23	21°59.7	149°13.2	-19°12.9	186°54.0	-5°31.5	119°51.0	-23°02.4	95°28.8	-22°25.8
Mer.pass.:21:32		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	37°02.1	164°12.5	-19°13.8	201°55.0	-5°32.1	134°52.9	-23°02.4	110°31.1	-22°25.8
1	52°04.6	179°11.8	-19°14.6	216°56.0	-5°32.8	149°54.9	-23°02.4	125°33.4	-22°25.8
2	67°07.1	194°11.0	-19°15.5	231°56.9	-5°33.4	164°56.8	-23°02.5	140°35.7	-22°25.8
3	82°09.5	209°10.3	-19°16.3	246°57.9	-5°34.0	179°58.8	-23°02.5	155°38.0	-22°25.8
4	97°12.0	224°09.6	-19°17.2	261°58.8	-5°34.7	195°00.7	-23°02.5	170°40.3	-22°25.8
5	112°14.5	239°08.9	-19°18.0	276°59.8	-5°35.3	210°02.7	-23°02.6	185°42.6	-22°25.8
6	127°16.9	254°08.2	-19°18.9	292°00.8	-5°35.9	225°04.6	-23°02.6	200°44.9	-22°25.7
7	142°19.4	269°07.5	-19°19.7	307°01.7	-5°36.6	240°06.6	-23°02.6	215°47.2	-22°25.7
8	157°21.9	284°06.8	-19°20.6	322°02.7	-5°37.2	255°08.6	-23°02.7	230°49.4	-22°25.7
9	172°24.3	299°06.1	-19°21.4	337°03.6	-5°37.8	270°10.5	-23°02.7	245°51.7	-22°25.7
10	187°26.8	314°05.4	-19°22.2	352°04.6	-5°38.5	285°12.5	-23°02.7	260°54.0	-22°25.7
11	202°29.2	329°04.7	-19°23.1	7°05.6	-5°39.1	300°14.4	-23°02.7	275°56.3	-22°25.7
12	217°31.7	344°04.0	-19°23.9	22°06.5	-5°39.8	315°16.4	-23°02.8	290°58.6	-22°25.7
13	232°34.2	359°03.3	-19°24.8	37°07.5	-5°40.4	330°18.3	-23°02.8	306°00.9	-22°25.6
14	247°36.6	14°02.6	-19°25.6	52°08.4	-5°41.0	345°20.3	-23°02.8	321°03.2	-22°25.6
15	262°39.1	29°01.9	-19°26.5	67°09.4	-5°41.7	0°22.2	-23°02.9	336°05.5	-22°25.6
16	277°41.6	44°01.1	-19°27.3	82°10.3	-5°42.3	15°24.2	-23°02.9	351°07.8	-22°25.6
17	292°44.0	59°00.4	-19°28.1	97°11.3	-5°42.9	30°26.1	-23°02.9	6°10.1	-22°25.6
18	307°46.5	73°59.7	-19°29.0	112°12.3	-5°43.6	45°28.1	-23°03.0	21°12.4	-22°25.6
19	322°49.0	88°59.0	-19°29.8	127°13.2	-5°44.2	60°30.0	-23°03.0	36°14.7	-22°25.5
20	337°51.4	103°58.3	-19°30.6	142°14.2	-5°44.9	75°32.0	-23°03.0	51°16.9	-22°25.5
21	352°53.9	118°57.6	-19°31.5	157°15.1	-5°45.5	90°33.9	-23°03.0	66°19.2	-22°25.5
22	7°56.4	133°56.9	-19°32.3	172°16.1	-5°46.1	105°35.9	-23°03.1	81°21.5	-22°25.5
23	22°58.8	148°56.2	-19°33.1	187°17.1	-5°46.8	120°37.8	-23°03.1	96°23.8	-22°25.5
Mer.pass.:21:28		v-0.7 d-0.9 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	38°01.3	163°55.4	-19°34.0	202°18.0	-5°47.4	135°39.8	-23°03.1	111°26.1	-22°25.5
1	53°03.7	178°54.7	-19°34.8	217°19.0	-5°48.0	150°41.7	-23°03.2	126°28.4	-22°25.5
2	68°06.2	193°54.0	-19°35.6	232°19.9	-5°48.7	165°43.7	-23°03.2	141°30.7	-22°25.4
3	83°08.7	208°53.3	-19°36.5	247°20.9	-5°49.3	180°45.6	-23°03.2	156°33.0	-22°25.4
4	98°11.1	223°52.6	-19°37.3	262°21.9	-5°49.9	195°47.6	-23°03.3	171°35.3	-22°25.4
5	113°13.6	238°51.9	-19°38.1	277°22.8	-5°50.6	210°49.5	-23°03.3	186°37.5	-22°25.4
6	128°16.1	253°51.1	-19°38.9	292°23.8	-5°51.2	225°51.5	-23°03.3	201°39.8	-22°25.4
7	143°18.5	268°50.4	-19°39.8	307°24.7	-5°51.8	240°53.4	-23°03.3	216°42.1	-22°25.4
8	158°21.0	283°49.7	-19°40.6	322°25.7	-5°52.5	255°55.4	-23°03.4	231°44.4	-22°25.4
9	173°23.5	298°49.0	-19°41.4	337°26.6	-5°53.1	270°57.3	-23°03.4	246°46.7	-22°25.3
10	188°25.9	313°48.3	-19°42.2	352°27.6	-5°53.8	285°59.3	-23°03.4	261°49.0	-22°25.3
11	203°28.4	328°47.5	-19°43.0	7°28.6	-5°54.4	301°01.2	-23°03.5	276°51.3	-22°25.3
12	218°30.8	343°46.8	-19°43.9	22°29.5	-5°55.0	316°03.2	-23°03.5	291°53.6	-22°25.3
13	233°33.3	358°46.1	-19°44.7	37°30.5	-5°55.7	331°05.1	-23°03.5	306°55.9	-22°25.3
14	248°35.8	13°45.4	-19°45.5	52°31.4	-5°56.3	346°07.1	-23°03.6	321°58.1	-22°25.3
15	263°38.2	28°44.6	-19°46.3	67°32.4	-5°56.9	1°09.0	-23°03.6	337°00.4	-22°25.3
16	278°40.7	43°43.9	-19°47.1	82°33.3	-5°57.6	16°11.0	-23°03.6	352°02.7	-22°25.2
17	293°43.2	58°43.2	-19°48.0	97°34.3	-5°58.2	31°12.9	-23°03.6	7°05.0	-22°25.2
18	308°45.6	73°42.5	-19°48.8	112°35.3	-5°58.8	46°14.9	-23°03.7	22°07.3	-22°25.2
19	323°48.1	88°41.7	-19°49.6	127°36.2	-5°59.5	61°16.8	-23°03.7	37°09.6	-22°25.2
20	338°50.6	103°41.0	-19°50.4	142°37.2	-6°00.1	76°18.8	-23°03.7	52°11.9	-22°25.2
21	353°53.0	118°40.3	-19°51.2	157°38.1	-6°00.7	91°20.7	-23°03.8	67°14.2	-22°25.2
22	8°55.5	133°39.6	-19°52.0	172°39.1	-6°01.4	106°22.7	-23°03.8	82°16.4	-22°25.1
23	23°58.0	148°38.8	-19°52.8	187°40.0	-6°02.0	121°24.6	-23°03.8	97°18.7	-22°25.1
Mer.pass.:21:24		v-0.7 d-0.8 m-3.8		v1.0 d-0.6 m1.8		v2.0 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°38.7	29°12.1
Ankaa	353°11.0	-42°12.1
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.8
Achernar	335°22.9	-57°08.3
Hamal	327°55.5	23°33.3
Polaris	315°25.4	89°20.7
Akamar	315°14.6	-40°13.6
Menkar	314°10.2	4°10.0
Mirfak	308°33.7	49°55.7
Aldebaran	290°44.1	16°32.9
Rigel	281°07.6	-8°10.7
Capella	280°27.7	46°00.9
Bellatrix	278°27.1	6°22.0
Elnath	278°06.9	28°37.3
Alnilam	275°41.7	-1°11.4
Betelgeuse	270°56.4	7°24.6
Canopus	263°53.9	-52°42.2
Sirius	258°29.7	-16°44.3
Adara	255°09.0	-28°59.8
Procyon	244°55.0	5°10.6
Pollux	243°22.3	27°58.6
Avior	234°16.3	-59°34.0
Suhail	222°49.3	-43°30.4
Miaplacidus	221°39.0	-69°47.5
Alphard	217°51.9	-8°44.5
Regulus	207°39.0	11°52.3
Dubhe	193°46.7	61°38.6
Denebola	182°29.4	14°27.9
Gienah	175°48.1	-17°38.8
Acrux	173°05.1	-63°12.2
Gacrux	171°56.6	-57°13.1
Alioth	166°17.4	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.0
Hadar	148°42.4	-60°27.8
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.2	74°04.6
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.6	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.4	51°29.5
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.4	-56°40.4
Deneb	49°28.5	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.1	-46°52.1
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	**SHA**	**Mer.pass**
Venus	128°26.2	13:03
Mars	165°28.9	10:33
Jupiter	98°02.9	15:02
Saturn	73°33.0	16:39

2019/10/	**SHA**	**Mer.pass**
Venus	127°10.3	13:04
Mars	164°52.9	10:32
Jupiter	97°50.8	14:59
Saturn	73°29.0	16:35

2019/10/	**SHA**	**Mer.pass**
Venus	125°54.2	13:05
Mars	164°16.7	10:30
Jupiter	97°38.5	14:55
Saturn	73°24.8	16:32

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	184°02.5	-12°56.4	184°25.7	8.8	-7°48.9	-13.7	60.4
1	199°02.6	-12°57.2	198°53.5	8.8	-8°02.5	-13.6	60.3
2	214°02.6	-12°58.1	213°21.3	8.8	-8°16.1	-13.6	60.3
3	229°02.7	-12°58.9	227°49.1	8.8	-8°29.6	-13.5	60.3
4	244°02.7	-12°59.8	242°16.8	8.7	-8°43.1	-13.4	60.3
5	259°02.8	-13°00.6	256°44.6	8.7	-8°56.5	-13.4	60.3
6	274°02.8	-13°01.4	271°12.3	8.7	-9°09.9	-13.3	60.2
7	289°02.9	-13°02.3	285°40.0	8.7	-9°23.1	-13.2	60.2
8	304°02.9	-13°03.1	300°07.6	8.7	-9°36.4	-13.2	60.2
9	319°03.0	-13°04.0	314°35.3	8.6	-9°49.5	-13.1	60.2
10	334°03.0	-13°04.8	329°02.9	8.6	-10°02.6	-13.0	60.2
11	349°03.1	-13°05.6	343°30.5	8.6	-10°15.6	-13.0	60.1
12	4°03.1	-13°06.5	357°58.1	8.6	-10°28.5	-12.9	60.1
13	19°03.2	-13°07.3	12°25.7	8.6	-10°41.4	-12.8	60.1
14	34°03.2	-13°08.2	26°53.2	8.5	-10°54.2	-12.8	60.1
15	49°03.3	-13°09.0	41°20.7	8.5	-11°06.9	-12.7	60.0
16	64°03.3	-13°09.8	55°48.2	8.5	-11°19.5	-12.6	60.0
17	79°03.4	-13°10.7	70°15.7	8.5	-11°32.1	-12.5	60.0
18	94°03.4	-13°11.5	84°43.1	8.4	-11°44.6	-12.4	60.0
19	109°03.5	-13°12.3	99°10.6	8.4	-11°57.0	-12.4	59.9
20	124°03.5	-13°13.2	113°38.0	8.4	-12°09.3	-12.3	59.9
21	139°03.6	-13°14.0	128°05.4	8.4	-12°21.5	-12.2	59.9
22	154°03.6	-13°14.8	142°32.7	8.3	-12°33.7	-12.1	59.9
23	169°03.7	-13°15.7	157°00.1	8.3	-12°45.7	-12.0	59.8
	SD.=16.1	d=-0.8			S.D.=16.5		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	184°03.7	-13°16.5	171°27.4	8.3	-12°57.7	-11.9	59.8
1	199°03.7	-13°17.3	185°54.7	8.3	-13°09.6	-11.8	59.8
2	214°03.8	-13°18.2	200°21.9	8.3	-13°21.4	-11.7	59.8
3	229°03.8	-13°19.0	214°49.2	8.2	-13°33.1	-11.7	59.7
4	244°03.9	-13°19.8	229°16.4	8.2	-13°44.7	-11.6	59.7
5	259°03.9	-13°20.7	243°43.6	8.2	-13°56.2	-11.5	59.7
6	274°04.0	-13°21.5	258°10.8	8.2	-14°07.6	-11.4	59.6
7	289°04.0	-13°22.3	272°37.9	8.1	-14°18.9	-11.3	59.6
8	304°04.1	-13°23.2	287°05.1	8.1	-14°30.1	-11.2	59.6
9	319°04.1	-13°24.0	301°32.2	8.1	-14°41.2	-11.1	59.6
10	334°04.1	-13°24.8	315°59.2	8.1	-14°52.3	-11.0	59.5
11	349°04.2	-13°25.6	330°26.3	8.1	-15°03.2	-10.9	59.5
12	4°04.2	-13°26.5	344°53.3	8.0	-15°14.0	-10.8	59.5
13	19°04.3	-13°27.3	359°20.4	8.0	-15°24.7	-10.7	59.4
14	34°04.3	-13°28.1	13°47.4	8.0	-15°35.3	-10.6	59.4
15	49°04.3	-13°29.0	28°14.3	8.0	-15°45.8	-10.4	59.4
16	64°04.4	-13°29.8	42°41.3	7.9	-15°56.2	-10.3	59.3
17	79°04.4	-13°30.6	57°08.2	7.9	-16°06.5	-10.2	59.3
18	94°04.5	-13°31.4	71°35.1	7.9	-16°16.7	-10.1	59.3
19	109°04.5	-13°32.3	86°02.0	7.9	-16°26.8	-10.0	59.2
20	124°04.5	-13°33.1	100°28.9	7.9	-16°36.7	-9.9	59.2
21	139°04.6	-13°33.9	114°55.7	7.8	-16°46.6	-9.8	59.2
22	154°04.6	-13°34.7	129°22.6	7.8	-16°56.3	-9.7	59.1
23	169°04.7	-13°35.6	143°49.4	7.8	-17°05.9	-9.6	59.1
	SD.=16.1	d=-0.8			S.D.=16.3		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	184°04.7	-13°36.4	158°16.2	7.8	-17°15.4	-9.4	59.1
1	199°04.7	-13°37.2	172°43.0	7.8	-17°24.8	-9.3	59.0
2	214°04.8	-13°38.0	187°09.7	7.8	-17°34.1	-9.2	59.0
3	229°04.8	-13°38.9	201°36.5	7.7	-17°43.2	-9.1	59.0
4	244°04.8	-13°39.7	216°03.2	7.7	-17°52.2	-9.0	58.9
5	259°04.9	-13°40.5	230°29.9	7.7	-18°01.2	-8.9	58.9
6	274°04.9	-13°41.3	244°56.6	7.7	-18°09.9	-8.7	58.9
7	289°05.0	-13°42.2	259°23.3	7.7	-18°18.6	-8.6	58.8
8	304°05.0	-13°43.0	273°49.9	7.7	-18°27.2	-8.5	58.8
9	319°05.0	-13°43.8	288°16.6	7.6	-18°35.6	-8.4	58.8
10	334°05.1	-13°44.6	302°43.2	7.6	-18°43.9	-8.2	58.7
11	349°05.1	-13°45.4	317°09.9	7.6	-18°52.1	-8.1	58.7
12	4°05.1	-13°46.3	331°36.5	7.6	-19°00.1	-8.0	58.7
13	19°05.2	-13°47.1	346°03.1	7.6	-19°08.1	-7.9	58.6
14	34°05.2	-13°47.9	0°29.7	7.6	-19°15.9	-7.7	58.6
15	49°05.2	-13°48.7	14°56.3	7.6	-19°23.6	-7.6	58.6
16	64°05.3	-13°49.5	29°22.8	7.6	-19°31.1	-7.5	58.5
17	79°05.3	-13°50.4	43°49.4	7.6	-19°38.5	-7.4	58.5
18	94°05.3	-13°51.2	58°16.0	7.6	-19°45.8	-7.2	58.4
19	109°05.4	-13°52.0	72°42.5	7.6	-19°53.0	-7.1	58.4
20	124°05.4	-13°52.8	87°09.1	7.5	-20°00.1	-7.0	58.4
21	139°05.4	-13°53.6	101°35.6	7.5	-20°07.0	-6.8	58.3
22	154°05.4	-13°54.4	116°02.1	7.5	-20°13.7	-6.7	58.3
23	169°05.5	-13°55.3	130°28.7	7.5	-20°20.4	-6.6	58.3
	SD.=16.1	d=-0.8			S.D.=16.1		

Lat.	Twilight Naut.	Twilight Civil	Sunrise	Sunset	Twilight Civil	Twilight Naut.
72	05:53	07:14	08:37	14:49	16:12	17:33
70	05:50	07:03	08:14	15:12	16:23	17:36
68	05:48	06:54	07:57	15:29	16:32	17:38
66	05:46	06:46	07:43	15:43	16:40	17:40
64	05:44	06:40	07:32	15:55	16:46	17:42
62	05:42	06:34	07:22	16:04	16:52	17:44
60	05:40	06:29	07:14	16:13	16:57	17:46
58	05:38	06:25	07:06	16:20	17:02	17:48
56	05:37	06:21	06:60	16:27	17:06	17:50
54	05:35	06:17	06:54	16:33	17:10	17:51
52	05:34	06:14	06:49	16:38	17:13	17:53
50	05:32	06:10	06:44	16:43	17:16	17:54
45	05:29	06:03	06:34	16:53	17:23	17:58
40	05:25	05:57	06:25	17:02	17:30	18:01
35	05:22	05:52	06:18	17:09	17:35	18:05
30	05:19	05:47	06:11	17:16	17:40	18:08
20	05:11	05:37	05:60	17:27	17:50	18:16
10	05:03	05:28	05:50	17:37	17:59	18:24
0	04:54	05:19	05:40	17:47	18:08	18:33
-10	04:44	05:09	05:31	17:57	18:19	18:44
-20	04:31	04:57	05:20	18:07	18:30	18:57
-30	04:14	04:43	05:08	18:20	18:45	19:15
-35	04:03	04:35	05:01	18:27	18:53	19:25
-40	03:50	04:24	04:53	18:35	19:04	19:39
-45	03:33	04:12	04:44	18:44	19:16	19:55
-50	03:12	03:57	04:33	18:56	19:32	20:17
-52	03:02	03:50	04:27	19:01	19:39	20:28
-54	02:49	03:41	04:21	19:07	19:48	20:40
-56	02:35	03:32	04:15	19:14	19:57	20:55
-58	02:18	03:21	04:08	19:21	20:08	21:12
-60	01:57	03:09	03:59	19:30	20:21	21:35

Lat.	Moonrise Mon	Moonrise Tue	Moonrise Wed	Moonset Mon	Moonset Tue	Moonset Wed
72	08:08	10:44	–:–	15:42	15:02	–:–
70	07:52	10:07	12:50	16:01	15:40	14:52
68	07:39	09:41	11:50	16:16	16:07	15:54
66	07:28	09:22	11:15	16:28	16:28	16:29
64	07:19	09:06	10:51	16:38	16:44	16:55
62	07:12	08:53	10:31	16:47	16:58	17:15
60	07:06	08:42	10:15	16:55	17:10	17:31
58	06:60	08:33	10:02	17:01	17:20	17:45
56	06:55	08:25	09:51	17:07	17:29	17:57
54	06:51	08:17	09:41	17:13	17:37	18:07
52	06:47	08:11	09:32	17:18	17:44	18:17
50	06:43	08:05	09:24	17:22	17:51	18:25
45	06:35	07:52	09:07	17:32	18:05	18:43
40	06:29	07:42	08:53	17:40	18:17	18:58
35	06:23	07:33	08:41	17:46	18:26	19:10
30	06:18	07:25	08:31	17:53	18:35	19:21
20	06:10	07:12	08:14	18:03	18:50	19:40
10	06:02	07:00	07:59	18:12	19:03	19:56
0	05:56	06:50	07:45	18:21	19:16	20:11
-10	05:49	06:39	07:31	18:30	19:28	20:27
-20	05:42	06:28	07:16	18:39	19:42	20:43
-30	05:34	06:15	06:59	18:50	19:57	21:02
-35	05:29	06:08	06:49	18:56	20:06	21:13
-40	05:24	05:59	06:38	19:04	20:16	21:26
-45	05:18	05:50	06:25	19:12	20:28	21:41
-50	05:11	05:38	06:09	19:22	20:43	21:59
-52	05:08	05:33	06:02	19:27	20:49	22:08
-54	05:04	05:27	05:54	19:32	20:57	22:17
-56	05:00	05:20	05:45	19:37	21:06	22:29
-58	04:56	05:13	05:34	19:44	21:15	22:41
-60	04:51	05:05	05:23	19:51	21:26	22:56

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
28	16:10	16:12	11:43	12:08	00:35	0(0%)
29	16:15	16:17	11:43	13:02	00:35	1(3%)
30	16:19	16:20	11:43	13:57	01:30	2(7%)

October 31, 01 ,02 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	39°00.4	163°38.1	-19°53.6	202°41.0	-6°02.6	136°26.6	-23°03.8	112°21.0	-22°25.1
1	54°02.9	178°37.4	-19°54.4	217°41.9	-6°03.3	151°28.5	-23°03.9	127°23.3	-22°25.1
2	69°05.3	193°36.7	-19°55.2	232°42.9	-6°03.9	166°30.5	-23°03.9	142°25.6	-22°25.1
3	84°07.8	208°35.9	-19°56.1	247°43.9	-6°04.6	181°32.4	-23°03.9	157°27.9	-22°25.1
4	99°10.3	223°35.2	-19°56.9	262°44.8	-6°05.2	196°34.4	-23°04.0	172°30.2	-22°25.1
5	114°12.7	238°34.5	-19°57.7	277°45.8	-6°05.8	211°36.3	-23°04.0	187°32.4	-22°25.0
6	129°15.2	253°33.7	-19°58.5	292°46.7	-6°06.5	226°38.3	-23°04.0	202°34.7	-22°25.0
7	144°17.7	268°33.0	-19°59.3	307°47.7	-6°07.1	241°40.2	-23°04.1	217°37.0	-22°25.0
8	159°20.1	283°32.3	-20°00.1	322°48.6	-6°07.7	256°42.1	-23°04.1	232°39.3	-22°25.0
9	174°22.6	298°31.5	-20°00.9	337°49.6	-6°08.4	271°44.1	-23°04.1	247°41.6	-22°25.0
10	189°25.1	313°30.8	-20°01.7	352°50.6	-6°09.0	286°46.0	-23°04.1	262°43.9	-22°25.0
11	204°27.5	328°30.1	-20°02.5	7°51.5	-6°09.6	301°48.0	-23°04.2	277°46.1	-22°24.9
12	219°30.0	343°29.3	-20°03.3	22°52.5	-6°10.3	316°49.9	-23°04.2	292°48.4	-22°24.9
13	234°32.5	358°28.6	-20°04.1	37°53.4	-6°10.9	331°51.9	-23°04.2	307°50.7	-22°24.9
14	249°34.9	13°27.9	-20°04.9	52°54.4	-6°11.5	346°53.8	-23°04.3	322°53.0	-22°24.9
15	264°37.4	28°27.1	-20°05.7	67°55.3	-6°12.2	1°55.8	-23°04.3	337°55.3	-22°24.9
16	279°39.8	43°26.4	-20°06.4	82°56.3	-6°12.8	16°57.7	-23°04.3	352°57.6	-22°24.9
17	294°42.3	58°25.7	-20°07.2	97°57.2	-6°13.4	31°59.7	-23°04.3	7°59.9	-22°24.9
18	309°44.8	73°24.9	-20°08.0	112°58.2	-6°14.1	47°01.6	-23°04.4	23°02.1	-22°24.8
19	324°47.2	88°24.2	-20°08.8	127°59.1	-6°14.7	62°03.5	-23°04.4	38°04.4	-22°24.8
20	339°49.7	103°23.4	-20°09.6	143°00.1	-6°15.3	77°05.5	-23°04.4	53°06.7	-22°24.8
21	354°52.2	118°22.7	-20°10.4	158°01.1	-6°16.0	92°07.4	-23°04.5	68°09.0	-22°24.8
22	9°54.6	133°22.0	-20°11.2	173°02.0	-6°16.6	107°09.4	-23°04.5	83°11.3	-22°24.8
23	24°57.1	148°21.2	-20°12.0	188°03.0	-6°17.2	122°11.3	-23°04.5	98°13.6	-22°24.8
Mer.pass.:21:20		v-0.7 d-0.8 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	39°59.6	163°20.5	-20°12.8	203°03.9	-6°17.9	137°13.3	-23°04.6	113°15.8	-22°24.7
1	55°02.0	178°19.7	-20°13.5	218°04.9	-6°18.5	152°15.2	-23°04.6	128°18.1	-22°24.7
2	70°04.5	193°19.0	-20°14.3	233°05.8	-6°19.1	167°17.1	-23°04.6	143°20.4	-22°24.7
3	85°07.0	208°18.3	-20°15.1	248°06.8	-6°19.8	182°19.1	-23°04.6	158°22.7	-22°24.7
4	100°09.4	223°17.5	-20°15.9	263°07.7	-6°20.4	197°21.0	-23°04.7	173°25.0	-22°24.7
5	115°11.9	238°16.8	-20°16.7	278°08.7	-6°21.0	212°23.0	-23°04.7	188°27.2	-22°24.7
6	130°14.3	253°16.0	-20°17.5	293°09.6	-6°21.7	227°24.9	-23°04.7	203°29.5	-22°24.6
7	145°16.8	268°15.3	-20°18.2	308°10.6	-6°22.3	242°26.9	-23°04.8	218°31.8	-22°24.6
8	160°19.3	283°14.5	-20°19.0	323°11.5	-6°22.9	257°28.8	-23°04.8	233°34.1	-22°24.6
9	175°21.7	298°13.8	-20°19.8	338°12.5	-6°23.6	272°30.7	-23°04.8	248°36.4	-22°24.6
10	190°24.2	313°13.1	-20°20.6	353°13.5	-6°24.2	287°32.7	-23°04.8	263°38.6	-22°24.6
11	205°26.7	328°12.3	-20°21.3	8°14.4	-6°24.8	302°34.6	-23°04.9	278°40.9	-22°24.6
12	220°29.1	343°11.6	-20°22.1	23°15.4	-6°25.5	317°36.6	-23°04.9	293°43.2	-22°24.6
13	235°31.6	358°10.8	-20°22.9	38°16.3	-6°26.1	332°38.5	-23°04.9	308°45.5	-22°24.5
14	250°34.1	13°10.1	-20°23.7	53°17.3	-6°26.7	347°40.5	-23°05.0	323°47.8	-22°24.5
15	265°36.5	28°09.3	-20°24.4	68°18.2	-6°27.4	2°42.4	-23°05.0	338°50.1	-22°24.5
16	280°39.0	43°08.6	-20°25.2	83°19.2	-6°28.0	17°44.3	-23°05.0	353°52.3	-22°24.5
17	295°41.5	58°07.8	-20°26.0	98°20.1	-6°28.6	32°46.3	-23°05.0	8°54.6	-22°24.5
18	310°43.9	73°07.1	-20°26.7	113°21.1	-6°29.2	47°48.2	-23°05.1	23°56.9	-22°24.5
19	325°46.4	88°06.3	-20°27.5	128°22.0	-6°29.9	62°50.2	-23°05.1	38°59.2	-22°24.4
20	340°48.8	103°05.6	-20°28.3	143°23.0	-6°30.5	77°52.1	-23°05.1	54°01.5	-22°24.4
21	355°51.3	118°04.8	-20°29.0	158°23.9	-6°31.1	92°54.0	-23°05.2	69°03.7	-22°24.4
22	10°53.8	133°04.1	-20°29.8	173°24.9	-6°31.8	107°56.0	-23°05.2	84°06.0	-22°24.4
23	25°56.2	148°03.3	-20°30.6	188°25.8	-6°32.4	122°57.9	-23°05.2	99°08.3	-22°24.4
Mer.pass.:21:16		v-0.7 d-0.8 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	40°58.7	163°02.6	-20°31.3	203°26.8	-6°33.0	137°59.9	-23°05.2	114°10.6	-22°24.4
1	56°01.2	178°01.8	-20°32.1	218°27.7	-6°33.7	153°01.8	-23°05.3	129°12.8	-22°24.3
2	71°03.6	193°01.0	-20°32.9	233°28.7	-6°34.3	168°03.7	-23°05.3	144°15.1	-22°24.3
3	86°06.1	208°00.3	-20°33.6	248°29.6	-6°34.9	183°05.7	-23°05.3	159°17.4	-22°24.3
4	101°08.6	222°59.5	-20°34.4	263°30.6	-6°35.6	198°07.6	-23°05.4	174°19.7	-22°24.3
5	116°11.0	237°58.8	-20°35.1	278°31.5	-6°36.2	213°09.6	-23°05.4	189°22.0	-22°24.3
6	131°13.5	252°58.0	-20°35.9	293°32.5	-6°36.8	228°11.5	-23°05.4	204°24.2	-22°24.3
7	146°15.9	267°57.3	-20°36.7	308°33.4	-6°37.5	243°13.4	-23°05.4	219°26.5	-22°24.2
8	161°18.4	282°56.5	-20°37.4	323°34.4	-6°38.1	258°15.4	-23°05.5	234°28.8	-22°24.2
9	176°20.9	297°55.8	-20°38.2	338°35.4	-6°38.7	273°17.3	-23°05.5	249°31.1	-22°24.2
10	191°23.3	312°55.0	-20°38.9	353°36.3	-6°39.3	288°19.2	-23°05.5	264°33.4	-22°24.2
11	206°25.8	327°54.2	-20°39.7	8°37.3	-6°40.0	303°21.2	-23°05.6	279°35.6	-22°24.2
12	221°28.3	342°53.5	-20°40.4	23°38.2	-6°40.6	318°23.1	-23°05.6	294°37.9	-22°24.2
13	236°30.7	357°52.7	-20°41.2	38°39.2	-6°41.2	333°25.1	-23°05.6	309°40.2	-22°24.2
14	251°33.2	12°52.0	-20°41.9	53°40.1	-6°41.9	348°27.0	-23°05.6	324°42.5	-22°24.1
15	266°35.7	27°51.2	-20°42.7	68°41.1	-6°42.5	3°28.9	-23°05.7	339°44.7	-22°24.1
16	281°38.1	42°50.4	-20°43.4	83°42.0	-6°43.1	18°30.9	-23°05.7	354°47.0	-22°24.1
17	296°40.6	57°49.7	-20°44.2	98°43.0	-6°43.8	33°32.8	-23°05.7	9°49.3	-22°24.1
18	311°43.1	72°48.9	-20°44.9	113°43.9	-6°44.4	48°34.8	-23°05.7	24°51.6	-22°24.1
19	326°45.5	87°48.1	-20°45.6	128°44.9	-6°45.0	63°36.7	-23°05.8	39°53.8	-22°24.1
20	341°48.0	102°47.4	-20°46.4	143°45.8	-6°45.7	78°38.6	-23°05.8	54°56.1	-22°24.0
21	356°50.4	117°46.6	-20°47.1	158°46.8	-6°46.3	93°40.6	-23°05.8	69°58.4	-22°24.0
22	11°52.9	132°45.9	-20°47.9	173°47.7	-6°46.9	108°42.5	-23°05.9	85°00.7	-22°24.0
23	26°55.4	147°45.1	-20°48.6	188°48.7	-6°47.5	123°44.4	-23°05.9	100°02.9	-22°24.0
Mer.pass.:21:12		v-0.8 d-0.8 m-3.8		v1.0 d-0.6 m1.8		v1.9 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.7	29°12.1
Ankaa	353°11.0	-42°12.1
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.8
Achernar	335°22.9	-57°08.3
Hamal	327°55.5	23°33.3
Polaris	315°24.8	89°20.7
Akamar	315°14.6	-40°13.6
Menkar	314°10.2	4°10.0
Mirfak	308°33.6	49°55.7
Aldebaran	290°44.1	16°32.9
Rigel	281°07.6	-8°10.7
Capella	280°27.7	46°00.9
Bellatrix	278°27.1	6°22.0
Elnath	278°06.9	28°37.3
Alnilam	275°41.7	-1°11.4
Betelgeuse	270°56.4	7°24.6
Canopus	263°53.9	-52°42.2
Sirius	258°29.6	-16°44.3
Adara	255°08.9	-28°59.8
Procyon	244°55.0	5°10.6
Pollux	243°22.2	27°58.6
Avior	234°16.2	-59°34.0
Suhail	222°49.3	-43°30.4
Miaplacidus	221°39.0	-69°47.5
Alphard	217°51.9	-8°44.5
Regulus	207°39.0	11°52.3
Dubhe	193°46.7	61°38.5
Denebola	182°29.4	14°27.8
Gienah	175°48.1	-17°38.8
Acrux	173°05.1	-63°12.2
Gacrux	171°56.6	-57°13.1
Alioth	166°17.4	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.0
Hadar	148°42.4	-60°27.8
Menkent	148°02.9	-36°27.8
Arcturus	145°52.0	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°01.0	-16°07.2
Kochab	137°21.2	74°04.6
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.6	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.5	51°29.5
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.4	-56°40.4
Deneb	49°28.6	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.1	-46°52.1
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/10/	SHA	Mer.pass
Venus	124°37.7	13:06
Mars	163°40.6	10:29
Jupiter	97°26.2	14:52
Saturn	73°20.6	16:28

2019/11/	SHA	Mer.pass
Venus	123°20.9	13:07
Mars	163°04.4	10:27
Jupiter	97°13.7	14:49
Saturn	73°16.3	16:24

2019/11/	SHA	Mer.pass
Venus	122°03.9	13:08
Mars	162°28.1	10:26
Jupiter	97°01.2	14:46
Saturn	73°11.9	16:21

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°05.5	-13°56.1	144°55.2	7.5	-20°26.9	-6.5	58.2
1	199°05.5	-13°56.9	159°21.7	7.5	-20°33.3	-6.3	58.2
2	214°05.6	-13°57.7	173°48.3	7.5	-20°39.6	-6.2	58.1
3	229°05.6	-13°58.5	188°14.8	7.5	-20°45.7	-6.1	58.1
4	244°05.6	-13°59.3	202°41.3	7.5	-20°51.7	-5.9	58.1
5	259°05.6	-14°00.1	217°07.9	7.5	-20°57.5	-5.8	58.0
6	274°05.7	-14°01.0	231°34.4	7.5	-21°03.3	-5.7	58.0
7	289°05.7	-14°01.8	246°00.9	7.5	-21°08.9	-5.5	58.0
8	304°05.7	-14°02.6	260°27.5	7.5	-21°14.3	-5.4	57.9
9	319°05.8	-14°03.4	274°54.0	7.6	-21°19.6	-5.3	57.9
10	334°05.8	-14°04.2	289°20.6	7.6	-21°24.8	-5.1	57.8
11	349°05.8	-14°05.0	303°47.2	7.6	-21°29.9	-5.0	57.8
12	4°05.8	-14°05.8	318°13.7	7.6	-21°34.8	-4.9	57.8
13	19°05.9	-14°06.6	332°40.3	7.6	-21°39.6	-4.7	57.7
14	34°05.9	-14°07.4	347°06.9	7.6	-21°44.2	-4.6	57.7
15	49°05.9	-14°08.3	1°33.5	7.6	-21°48.8	-4.5	57.7
16	64°05.9	-14°09.1	16°00.1	7.6	-21°53.2	-4.3	57.6
17	79°06.0	-14°09.9	30°26.7	7.6	-21°57.4	-4.2	57.6
18	94°06.0	-14°10.7	44°53.4	7.7	-22°01.5	-4.0	57.5
19	109°06.0	-14°11.5	59°20.0	7.7	-22°05.5	-3.9	57.5
20	124°06.0	-14°12.3	73°46.7	7.7	-22°09.3	-3.8	57.5
21	139°06.1	-14°13.1	88°13.4	7.7	-22°13.0	-3.6	57.4
22	154°06.1	-14°13.9	102°40.1	7.7	-22°16.6	-3.5	57.4
23	169°06.1	-14°14.7	117°06.9	7.7	-22°20.1	-3.4	57.4
	SD.=16.1	d=-0.8			S.D.=15.9		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.1	-14°15.5	131°33.6	7.8	-22°23.4	-3.2	57.3
1	199°06.1	-14°16.3	146°00.4	7.8	-22°26.5	-3.1	57.3
2	214°06.2	-14°17.1	160°27.2	7.8	-22°29.6	-3.0	57.3
3	229°06.2	-14°17.9	174°54.0	7.8	-22°32.5	-2.8	57.2
4	244°06.2	-14°18.7	189°20.8	7.9	-22°35.2	-2.7	57.2
5	259°06.2	-14°19.5	203°47.7	7.9	-22°37.9	-2.6	57.1
6	274°06.2	-14°20.4	218°14.6	7.9	-22°40.4	-2.4	57.1
7	289°06.3	-14°21.2	232°41.5	7.9	-22°42.7	-2.3	57.1
8	304°06.3	-14°22.0	247°08.5	8.0	-22°45.0	-2.2	57.0
9	319°06.3	-14°22.8	261°35.5	8.0	-22°47.1	-2.0	57.0
10	334°06.3	-14°23.6	276°02.5	8.0	-22°49.0	-1.9	57.0
11	349°06.3	-14°24.4	290°29.5	8.1	-22°50.8	-1.8	56.9
12	4°06.4	-14°25.2	304°56.6	8.1	-22°52.5	-1.6	56.9
13	19°06.4	-14°26.0	319°23.7	8.1	-22°54.1	-1.5	56.8
14	34°06.4	-14°26.8	333°50.8	8.2	-22°55.5	-1.4	56.8
15	49°06.4	-14°27.6	348°18.0	8.2	-22°56.8	-1.2	56.8
16	64°06.4	-14°28.4	2°45.2	8.2	-22°58.0	-1.1	56.7
17	79°06.4	-14°29.2	17°12.5	8.3	-22°59.1	-1.0	56.7
18	94°06.4	-14°30.0	31°39.8	8.3	-22°60.0	-0.8	56.7
19	109°06.5	-14°30.8	46°07.1	8.3	-23°00.7	-0.7	56.6
20	124°06.5	-14°31.6	60°34.5	8.4	-23°01.4	-0.6	56.6
21	139°06.5	-14°32.4	75°01.9	8.4	-23°01.9	-0.5	56.6
22	154°06.5	-14°33.2	89°29.3	8.5	-23°02.3	-0.3	56.5
23	169°06.5	-14°34.0	103°56.8	8.5	-23°02.6	-0.2	56.5
	SD.=16.1	d=-0.8			S.D.=15.6		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.5	-14°34.7	118°24.4	8.6	-23°02.7	-0.1	56.5
1	199°06.5	-14°35.5	132°52.0	8.6	-23°02.7	0.1	56.4
2	214°06.6	-14°36.3	147°19.6	8.7	-23°02.6	0.2	56.4
3	229°06.6	-14°37.1	161°47.3	8.7	-23°02.3	0.3	56.4
4	244°06.6	-14°37.9	176°15.0	8.7	-23°02.0	0.4	56.3
5	259°06.6	-14°38.7	190°42.7	8.8	-23°01.5	0.6	56.3
6	274°06.6	-14°39.5	205°10.6	8.8	-23°00.8	0.7	56.3
7	289°06.6	-14°40.3	219°38.4	8.9	-23°00.1	0.8	56.2
8	304°06.6	-14°41.1	234°06.3	8.9	-22°59.2	0.9	56.2
9	319°06.6	-14°41.9	248°34.3	9.0	-22°58.2	1.1	56.2
10	334°06.7	-14°42.7	263°02.3	9.0	-22°57.1	1.2	56.1
11	349°06.7	-14°43.5	277°30.4	9.1	-22°55.9	1.3	56.1
12	4°06.7	-14°44.3	291°58.5	9.1	-22°54.5	1.4	56.1
13	19°06.7	-14°45.1	306°26.7	9.2	-22°53.0	1.5	56.0
14	34°06.7	-14°45.9	320°54.9	9.3	-22°51.4	1.7	56.0
15	49°06.7	-14°46.6	335°23.2	9.3	-22°49.7	1.8	56.0
16	64°06.7	-14°47.4	349°51.5	9.4	-22°47.9	1.9	55.9
17	79°06.7	-14°48.2	4°19.9	9.4	-22°45.9	2.0	55.9
18	94°06.7	-14°49.0	18°48.4	9.5	-22°43.8	2.1	55.9
19	109°06.7	-14°49.8	33°16.9	9.5	-22°41.6	2.3	55.8
20	124°06.7	-14°50.6	47°45.5	9.6	-22°39.3	2.4	55.8
21	139°06.7	-14°51.4	62°14.1	9.7	-22°36.9	2.5	55.8
22	154°06.7	-14°52.2	76°42.8	9.7	-22°34.3	2.6	55.8
23	169°06.8	-14°53.0	91°11.5	9.8	-22°31.7	2.7	55.7
	SD.=16.1	d=-0.8			S.D.=15.4		

	Twilight				**Twilight**	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:05	07:28	08:55	14:31	15:58	17:20
70	06:01	07:15	08:29	14:57	16:11	17:25
68	05:57	07:04	08:09	15:17	16:21	17:28
66	05:54	06:56	07:54	15:32	16:30	17:31
64	05:52	06:48	07:41	15:45	16:38	17:34
62	05:49	06:42	07:30	15:56	16:44	17:37
60	05:47	06:36	07:21	16:05	16:50	17:39
58	05:45	06:31	07:13	16:13	16:55	17:42
56	05:42	06:27	07:06	16:20	16:60	17:44
54	05:41	06:22	06:60	16:27	17:04	17:46
52	05:39	06:19	06:54	16:32	17:08	17:48
50	05:37	06:15	06:49	16:37	17:11	17:50
45	05:33	06:07	06:38	16:49	17:19	17:54
40	05:29	06:00	06:29	16:58	17:26	17:58
35	05:25	05:54	06:21	17:06	17:32	18:02
30	05:21	05:49	06:14	17:13	17:38	18:06
20	05:12	05:39	06:01	17:26	17:48	18:14
10	05:04	05:29	05:50	17:37	17:58	18:23
0	04:54	05:19	05:40	17:47	18:08	18:33
-10	04:43	05:08	05:30	17:58	18:19	18:45
-20	04:29	04:56	05:19	18:09	18:32	18:59
-30	04:11	04:40	05:06	18:22	18:47	19:17
-35	03:59	04:31	04:58	18:30	18:57	19:29
-40	03:45	04:20	04:49	18:38	19:08	19:43
-45	03:28	04:07	04:39	18:49	19:21	20:01
-50	03:05	03:51	04:27	19:01	19:37	20:24
-52	02:54	03:43	04:21	19:07	19:45	20:35
-54	02:41	03:34	04:15	19:13	19:54	20:49
-56	02:25	03:24	04:08	19:21	20:05	21:04
-58	02:06	03:13	04:00	19:29	20:16	21:24
-60	01:42	02:59	03:51	19:38	20:30	21:50

		Moonrise			**Moonset**	
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	14:30	–:–	–:–	15:10	–:–	–:–
66	13:05	14:38	15:27	16:35	16:58	18:00
64	12:28	13:47	14:39	17:13	17:49	18:48
62	12:01	13:15	14:08	17:40	18:20	19:19
60	11:41	12:52	13:45	18:01	18:44	19:42
58	11:24	12:33	13:26	18:18	19:03	20:00
56	11:09	12:17	13:11	18:33	19:19	20:16
54	10:57	12:03	12:57	18:45	19:32	20:29
52	10:46	11:52	12:45	18:56	19:44	20:41
50	10:37	11:41	12:35	19:06	19:55	20:51
45	10:17	11:19	12:13	19:27	20:17	21:12
40	10:00	11:02	11:56	19:44	20:35	21:30
35	09:47	10:47	11:41	19:58	20:50	21:44
30	09:35	10:34	11:28	20:10	21:03	21:57
20	09:14	10:12	11:06	20:31	21:25	22:18
10	08:57	09:53	10:47	20:50	21:44	22:37
0	08:40	09:35	10:29	21:07	22:02	22:55
-10	08:24	09:18	10:12	21:24	22:19	23:12
-20	08:06	08:59	09:53	21:42	22:39	23:30
-30	07:47	08:37	09:31	22:04	23:00	23:52
-35	07:35	08:25	09:18	22:16	23:13	–:–
-40	07:22	08:10	09:03	22:30	23:28	–:–
-45	07:06	07:53	08:46	22:47	23:46	–:–
-50	06:47	07:32	08:24	23:08	–:–	00:08
-52	06:38	07:21	08:13	23:18	–:–	00:18
-54	06:28	07:10	08:02	23:29	–:–	00:30
-56	06:16	06:57	07:48	23:42	–:–	00:43
-58	06:03	06:42	07:33	23:57	–:–	00:59
-60	05:48	06:24	07:14	–:–	00:15	01:18

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
31	16:22	16:23	11:43	14:53	02:25	3(14%)
1	16:24	16:25	11:43	15:48	03:21	4(22%)
2	16:26	16:27	11:43	16:42	04:15	5(31%)

November 03, 04 ,05 (Sun., Mon., Tue.)

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	41°57.8	162°44.3	-20°49.4	203°49.6	-6°48.2	138°46.4	-23°05.9	115°05.2	-22°24.0
1	57°00.3	177°43.6	-20°50.1	218°50.6	-6°48.8	153°48.3	-23°05.9	130°07.5	-22°24.0
2	72°02.8	192°42.8	-20°50.8	233°51.5	-6°49.4	168°50.2	-23°06.0	145°09.8	-22°23.9
3	87°05.2	207°42.0	-20°51.6	248°52.5	-6°50.1	183°52.2	-23°06.0	160°12.0	-22°23.9
4	102°07.7	222°41.3	-20°52.3	263°53.4	-6°50.7	198°54.1	-23°06.0	175°14.3	-22°23.9
5	117°10.2	237°40.5	-20°53.0	278°54.4	-6°51.3	213°56.0	-23°06.1	190°16.6	-22°23.9
6	132°12.6	252°39.7	-20°53.8	293°55.3	-6°52.0	228°58.0	-23°06.1	205°18.9	-22°23.9
7	147°15.1	267°38.9	-20°54.5	308°56.3	-6°52.6	243°59.9	-23°06.1	220°21.1	-22°23.9
8	162°17.6	282°38.2	-20°55.2	323°57.2	-6°53.2	259°01.9	-23°06.1	235°23.4	-22°23.8
9	177°20.0	297°37.4	-20°56.0	338°58.1	-6°53.8	274°03.8	-23°06.2	250°25.7	-22°23.8
10	192°22.5	312°36.6	-20°56.7	353°59.1	-6°54.5	289°05.7	-23°06.2	265°28.0	-22°23.8
11	207°24.9	327°35.9	-20°57.4	9°00.0	-6°55.1	304°07.7	-23°06.2	280°30.2	-22°23.8
12	222°27.4	342°35.1	-20°58.1	24°01.0	-6°55.7	319°09.6	-23°06.2	295°32.5	-22°23.8
13	237°29.9	357°34.3	-20°58.9	39°01.9	-6°56.4	334°11.5	-23°06.3	310°34.8	-22°23.8
14	252°32.3	12°33.6	-20°59.6	54°02.9	-6°57.0	349°13.5	-23°06.3	325°37.1	-22°23.7
15	267°34.8	27°32.8	-21°00.3	69°03.8	-6°57.6	4°15.4	-23°06.3	340°39.3	-22°23.7
16	282°37.3	42°32.0	-21°01.0	84°04.8	-6°58.2	19°17.3	-23°06.4	355°41.6	-22°23.7
17	297°39.7	57°31.2	-21°01.8	99°05.7	-6°58.9	34°19.3	-23°06.4	10°43.9	-22°23.7
18	312°42.2	72°30.5	-21°02.5	114°06.7	-6°59.5	49°21.2	-23°06.4	25°46.2	-22°23.7
19	327°44.7	87°29.7	-21°03.2	129°07.6	-7°00.1	64°23.1	-23°06.4	40°48.4	-22°23.6
20	342°47.1	102°28.9	-21°03.9	144°08.6	-7°00.8	79°25.1	-23°06.5	55°50.7	-22°23.6
21	357°49.6	117°28.1	-21°04.6	159°09.5	-7°01.4	94°27.0	-23°06.5	70°53.0	-22°23.6
22	12°52.1	132°27.4	-21°05.4	174°10.5	-7°02.0	109°28.9	-23°06.5	85°55.2	-22°23.6
23	27°54.5	147°26.6	-21°06.1	189°11.4	-7°02.6	124°30.9	-23°06.5	100°57.5	-22°23.6
Mer.pass.:21:08		v-0.8 d-0.7 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	42°57.0	162°25.8	-21°06.8	204°12.4	-7°03.3	139°32.8	-23°06.6	115°59.8	-22°23.6
1	57°59.4	177°25.0	-21°07.5	219°13.3	-7°03.9	154°34.7	-23°06.6	131°02.1	-22°23.5
2	73°01.9	192°24.2	-21°08.2	234°14.3	-7°04.5	169°36.7	-23°06.6	146°04.3	-22°23.5
3	88°04.4	207°23.5	-21°08.9	249°15.2	-7°05.2	184°38.6	-23°06.7	161°06.6	-22°23.5
4	103°06.8	222°22.7	-21°09.6	264°16.2	-7°05.8	199°40.5	-23°06.7	176°08.9	-22°23.5
5	118°09.3	237°21.9	-21°10.4	279°17.1	-7°06.4	214°42.5	-23°06.7	191°11.1	-22°23.5
6	133°11.8	252°21.1	-21°11.1	294°18.1	-7°07.0	229°44.4	-23°06.7	206°13.4	-22°23.5
7	148°14.2	267°20.3	-21°11.8	309°19.0	-7°07.7	244°46.3	-23°06.8	221°15.7	-22°23.4
8	163°16.7	282°19.6	-21°12.5	324°19.9	-7°08.3	259°48.2	-23°06.8	236°18.0	-22°23.4
9	178°19.2	297°18.8	-21°13.2	339°20.9	-7°08.9	274°50.2	-23°06.8	251°20.2	-22°23.4
10	193°21.6	312°18.0	-21°13.9	354°21.8	-7°09.5	289°52.1	-23°06.8	266°22.5	-22°23.4
11	208°24.1	327°17.2	-21°14.6	9°22.8	-7°10.2	304°54.0	-23°06.9	281°24.8	-22°23.4
12	223°26.5	342°16.4	-21°15.3	24°23.7	-7°10.8	319°56.0	-23°06.9	296°27.0	-22°23.4
13	238°29.0	357°15.6	-21°16.0	39°24.7	-7°11.4	334°57.9	-23°06.9	311°29.3	-22°23.3
14	253°31.5	12°14.9	-21°16.7	54°25.6	-7°12.1	349°59.8	-23°07.0	326°31.6	-22°23.3
15	268°33.9	27°14.1	-21°17.4	69°26.6	-7°12.7	5°01.8	-23°07.0	341°33.9	-22°23.3
16	283°36.4	42°13.3	-21°18.1	84°27.5	-7°13.3	20°03.7	-23°07.0	356°36.1	-22°23.3
17	298°38.9	57°12.5	-21°18.8	99°28.5	-7°13.9	35°05.6	-23°07.0	11°38.4	-22°23.3
18	313°41.3	72°11.7	-21°19.5	114°29.4	-7°14.6	50°07.6	-23°07.1	26°40.7	-22°23.3
19	328°43.8	87°10.9	-21°20.2	129°30.3	-7°15.2	65°09.5	-23°07.1	41°42.9	-22°23.2
20	343°46.3	102°10.1	-21°20.9	144°31.3	-7°15.8	80°11.4	-23°07.1	56°45.2	-22°23.2
21	358°48.7	117°09.3	-21°21.6	159°32.2	-7°16.4	95°13.3	-23°07.1	71°47.5	-22°23.2
22	13°51.2	132°08.6	-21°22.3	174°33.2	-7°17.1	110°15.3	-23°07.2	86°49.7	-22°23.2
23	28°53.7	147°07.8	-21°23.0	189°34.1	-7°17.7	125°17.2	-23°07.2	101°52.0	-22°23.2
Mer.pass.:21:04		v-0.8 d-0.7 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.8		v2.3 d0.0 m0.6	

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	43°56.1	162°07.0	-21°23.6	204°35.1	-7°18.3	140°19.1	-23°07.2	116°54.3	-22°23.1
1	58°58.6	177°06.2	-21°24.3	219°36.0	-7°18.9	155°21.1	-23°07.3	131°56.5	-22°23.1
2	74°01.0	192°05.4	-21°25.0	234°37.0	-7°19.6	170°23.0	-23°07.3	146°58.8	-22°23.1
3	89°03.5	207°04.6	-21°25.7	249°37.9	-7°20.2	185°24.9	-23°07.3	162°01.1	-22°23.1
4	104°06.0	222°03.8	-21°26.4	264°38.9	-7°20.8	200°26.8	-23°07.3	177°03.4	-22°23.1
5	119°08.4	237°03.0	-21°27.1	279°39.8	-7°21.5	215°28.8	-23°07.4	192°05.6	-22°23.1
6	134°10.9	252°02.2	-21°27.8	294°40.7	-7°22.1	230°30.7	-23°07.4	207°07.9	-22°23.0
7	149°13.4	267°01.4	-21°28.4	309°41.7	-7°22.7	245°32.6	-23°07.4	222°10.2	-22°23.0
8	164°15.8	282°00.6	-21°29.1	324°42.6	-7°23.3	260°34.6	-23°07.4	237°12.4	-22°23.0
9	179°18.3	296°59.8	-21°29.8	339°43.6	-7°24.0	275°36.5	-23°07.5	252°14.7	-22°23.0
10	194°20.8	311°59.1	-21°30.5	354°44.5	-7°24.6	290°38.4	-23°07.5	267°17.0	-22°23.0
11	209°23.2	326°58.3	-21°31.2	9°45.5	-7°25.2	305°40.3	-23°07.5	282°19.2	-22°23.0
12	224°25.7	341°57.5	-21°31.8	24°46.4	-7°25.8	320°42.3	-23°07.5	297°21.5	-22°22.9
13	239°28.2	356°56.7	-21°32.5	39°47.3	-7°26.5	335°44.2	-23°07.6	312°23.8	-22°22.9
14	254°30.6	11°55.9	-21°33.2	54°48.3	-7°27.1	350°46.1	-23°07.6	327°26.0	-22°22.9
15	269°33.1	26°55.1	-21°33.9	69°49.2	-7°27.7	5°48.1	-23°07.6	342°28.3	-22°22.9
16	284°35.5	41°54.3	-21°34.5	84°50.2	-7°28.3	20°50.0	-23°07.6	357°30.6	-22°22.9
17	299°38.0	56°53.5	-21°35.2	99°51.1	-7°29.0	35°51.9	-23°07.7	12°32.8	-22°22.8
18	314°40.5	71°52.7	-21°35.9	114°52.1	-7°29.6	50°53.8	-23°07.7	27°35.1	-22°22.8
19	329°42.9	86°51.9	-21°36.6	129°53.0	-7°30.2	65°55.8	-23°07.7	42°37.4	-22°22.8
20	344°45.4	101°51.1	-21°37.2	144°54.0	-7°30.8	80°57.7	-23°07.8	57°39.6	-22°22.8
21	359°47.9	116°50.3	-21°37.9	159°54.9	-7°31.5	95°59.6	-23°07.8	72°41.9	-22°22.8
22	14°50.3	131°49.5	-21°38.6	174°55.8	-7°32.1	111°01.5	-23°07.8	87°44.2	-22°22.8
23	29°52.8	146°48.7	-21°39.2	189°56.8	-7°32.7	126°03.5	-23°07.8	102°46.4	-22°22.7
Mer.pass.:21:00		v-0.8 d-0.7 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.3 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°38.7	29°12.1
Ankaa	353°11.0	-42°12.1
Schedar	349°35.1	56°38.8
Diphda	348°51.1	-17°52.8
Achernar	335°22.9	-57°08.3
Hamal	327°55.5	23°33.3
Polaris	315°24.4	89°20.7
Akamar	315°14.6	-40°13.6
Menkar	314°10.2	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.1	16°32.9
Rigel	281°07.6	-8°10.7
Capella	280°27.6	46°00.9
Bellatrix	278°27.1	6°22.0
Elnath	278°06.8	28°37.3
Alnilam	275°41.7	-1°11.4
Betelgeuse	270°56.4	7°24.6
Canopus	263°53.9	-52°42.2
Sirius	258°29.6	-16°44.3
Adara	255°08.9	-28°59.8
Procyon	244°55.0	5°10.6
Pollux	243°22.2	27°58.6
Avior	234°16.2	-59°34.1
Suhail	222°49.3	-43°30.4
Miaplacidus	221°38.9	-69°47.5
Alphard	217°51.9	-8°44.5
Regulus	207°38.9	11°52.3
Dubhe	193°46.7	61°38.5
Denebola	182°29.4	14°27.8
Gienah	175°48.1	-17°38.8
Acrux	173°05.1	-63°12.2
Gacrux	171°56.6	-57°13.1
Alioth	166°17.4	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.0
Hadar	148°42.4	-60°27.8
Menkent	148°02.9	-36°27.8
Arcturus	145°51.9	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.6
Alphecca	126°07.7	26°39.2
Antares	112°21.2	-26°28.4
Atria	107°19.6	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.5	51°29.5
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.5	-56°40.4
Deneb	49°28.6	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.1	-46°52.1
Fomalhaut	15°19.0	-29°31.1
Scheat	13°49.0	28°11.5
Markab	13°33.8	15°18.8

2019/11/	SHA	Mer.pass
Venus	120°46.5	13:10
Mars	161°51.8	10:24
Jupiter	96°48.5	14:43
Saturn	73°07.4	16:17

2019/11/	SHA	Mer.pass
Venus	119°28.8	13:11
Mars	161°15.4	10:23
Jupiter	96°35.8	14:40
Saturn	73°02.8	16:14

2019/11/	SHA	Mer.pass
Venus	118°10.9	13:12
Mars	160°39.0	10:21
Jupiter	96°23.0	14:37
Saturn	72°58.2	16:10

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.8	-14°53.7	105°40.3	9.8	-22°28.9	2.8	55.7
1	199°06.8	-14°54.5	120°09.2	9.9	-22°26.0	2.9	55.7
2	214°06.8	-14°55.3	134°38.1	10.0	-22°23.0	3.1	55.6
3	229°06.8	-14°56.1	149°07.1	10.0	-22°19.9	3.2	55.6
4	244°06.8	-14°56.9	163°36.1	10.1	-22°16.7	3.3	55.6
5	259°06.8	-14°57.7	178°05.2	10.1	-22°13.4	3.4	55.5
6	274°06.8	-14°58.4	192°34.4	10.2	-22°09.9	3.5	55.5
7	289°06.8	-14°59.2	207°03.6	10.3	-22°06.4	3.6	55.5
8	304°06.8	-15°00.0	221°32.9	10.3	-22°02.7	3.7	55.5
9	319°06.8	-15°00.8	236°02.3	10.4	-21°59.0	3.8	55.4
10	334°06.8	-15°01.6	250°31.7	10.5	-21°55.1	3.9	55.4
11	349°06.8	-15°02.4	265°01.2	10.5	-21°51.1	4.0	55.4
12	4°06.8	-15°03.1	279°30.7	10.6	-21°47.1	4.1	55.4
13	19°06.8	-15°03.9	294°00.3	10.6	-21°42.9	4.2	55.3
14	34°06.8	-15°04.7	308°30.0	10.7	-21°38.6	4.3	55.3
15	49°06.8	-15°05.5	322°59.7	10.8	-21°34.2	4.4	55.3
16	64°06.8	-15°06.3	337°29.5	10.8	-21°29.7	4.5	55.3
17	79°06.8	-15°07.0	351°59.4	10.9	-21°25.1	4.6	55.2
18	94°06.8	-15°07.8	6°29.4	11.0	-21°20.4	4.7	55.2
19	109°06.8	-15°08.6	20°59.3	11.0	-21°15.6	4.8	55.2
20	124°06.8	-15°09.4	35°29.4	11.1	-21°10.7	4.9	55.2
21	139°06.8	-15°10.2	49°59.5	11.2	-21°05.7	5.0	55.1
22	154°06.8	-15°10.9	64°29.7	11.2	-21°00.7	5.1	55.1
23	169°06.8	-15°11.7	78°60.0	11.3	-20°55.5	5.2	55.1
	SD.=16.1	d=-0.8	S.D.=15.2				

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.8	-15°12.5	93°30.3	11.4	-20°50.2	5.3	55.1
1	199°06.8	-15°13.3	108°00.7	11.4	-20°44.8	5.4	55.0
2	214°06.8	-15°14.0	122°31.2	11.5	-20°39.4	5.5	55.0
3	229°06.8	-15°14.8	137°01.7	11.6	-20°33.8	5.6	55.0
4	244°06.8	-15°15.6	151°32.3	11.6	-20°28.1	5.7	55.0
5	259°06.8	-15°16.4	166°02.9	11.7	-20°22.4	5.8	54.9
6	274°06.8	-15°17.1	180°33.6	11.7	-20°16.5	5.9	54.9
7	289°06.8	-15°17.9	195°04.4	11.8	-20°10.6	6.0	54.9
8	304°06.7	-15°18.7	209°35.3	11.9	-20°04.6	6.1	54.9
9	319°06.7	-15°19.4	224°06.2	11.9	-19°58.5	6.2	54.9
10	334°06.7	-15°20.2	238°37.2	12.0	-19°52.3	6.2	54.8
11	349°06.7	-15°21.0	253°08.2	12.1	-19°46.0	6.3	54.8
12	4°06.7	-15°21.8	267°39.3	12.1	-19°39.6	6.4	54.8
13	19°06.7	-15°22.5	282°10.5	12.2	-19°33.2	6.5	54.8
14	34°06.7	-15°23.3	296°41.7	12.3	-19°26.6	6.6	54.8
15	49°06.7	-15°24.1	311°13.0	12.3	-19°20.0	6.7	54.7
16	64°06.7	-15°24.8	325°44.4	12.4	-19°13.3	6.8	54.7
17	79°06.7	-15°25.6	340°15.8	12.5	-19°06.5	6.8	54.7
18	94°06.7	-15°26.4	354°47.3	12.5	-18°59.6	6.9	54.7
19	109°06.7	-15°27.1	9°18.8	12.6	-18°52.7	7.0	54.7
20	124°06.6	-15°27.9	23°50.5	12.6	-18°45.7	7.1	54.7
21	139°06.6	-15°28.7	38°22.1	12.7	-18°38.5	7.2	54.6
22	154°06.6	-15°29.4	52°53.9	12.8	-18°31.3	7.2	54.6
23	169°06.6	-15°30.2	67°25.7	12.8	-18°24.1	7.3	54.6
	SD.=16.1	d=-0.8	S.D.=15.0				

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	184°06.6	-15°31.0	81°57.5	12.9	-18°16.7	7.4	54.6
1	199°06.6	-15°31.7	96°29.5	13.0	-18°09.3	7.5	54.6
2	214°06.6	-15°32.5	111°01.4	13.0	-18°01.8	7.5	54.6
3	229°06.6	-15°33.3	125°33.5	13.1	-17°54.2	7.6	54.5
4	244°06.6	-15°34.0	140°05.6	13.1	-17°46.6	7.7	54.5
5	259°06.5	-15°34.8	154°37.8	13.2	-17°38.8	7.8	54.5
6	274°06.5	-15°35.6	169°10.0	13.3	-17°31.0	7.8	54.5
7	289°06.5	-15°36.3	183°42.3	13.3	-17°23.2	7.9	54.5
8	304°06.5	-15°37.1	198°14.6	13.4	-17°15.2	8.0	54.5
9	319°06.5	-15°37.8	212°47.0	13.4	-17°07.2	8.0	54.4
10	334°06.5	-15°38.6	227°19.5	13.5	-16°59.1	8.1	54.4
11	349°06.5	-15°39.4	241°52.0	13.5	-16°51.0	8.2	54.4
12	4°06.4	-15°40.1	256°24.5	13.6	-16°42.8	8.3	54.4
13	19°06.4	-15°40.9	270°57.2	13.7	-16°34.5	8.3	54.4
14	34°06.4	-15°41.6	285°29.8	13.7	-16°26.1	8.4	54.4
15	49°06.4	-15°42.4	300°02.6	13.8	-16°17.7	8.5	54.4
16	64°06.4	-15°43.2	314°35.4	13.8	-16°09.2	8.5	54.4
17	79°06.4	-15°43.9	329°08.2	13.9	-16°00.6	8.6	54.3
18	94°06.3	-15°44.7	343°41.1	13.9	-15°52.0	8.7	54.3
19	109°06.3	-15°45.4	358°14.0	14.0	-15°43.3	8.7	54.3
20	124°06.3	-15°46.2	12°47.0	14.0	-15°34.6	8.8	54.3
21	139°06.3	-15°46.9	27°20.1	14.1	-15°25.8	8.8	54.3
22	154°06.3	-15°47.7	41°53.2	14.1	-15°16.9	8.9	54.3
23	169°06.2	-15°48.5	56°26.4	14.2	-15°08.0	9.0	54.3
	SD.=16.1	d=-0.8	S.D.=14.9				

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:17	07:41	09:14	14:12	15:44	17:09
70	06:11	07:27	08:44	14:42	15:59	17:14
68	06:07	07:15	08:22	15:04	16:11	17:19
66	06:03	07:05	08:05	15:21	16:21	17:23
64	05:59	06:57	07:51	15:35	16:29	17:27
62	05:56	06:49	07:39	15:47	16:37	17:30
60	05:53	06:43	07:29	15:57	16:43	17:33
58	05:51	06:37	07:20	16:06	16:49	17:36
56	05:48	06:32	07:13	16:14	16:54	17:38
54	05:46	06:28	07:06	16:21	16:58	17:41
52	05:43	06:24	06:60	16:27	17:03	17:43
50	05:41	06:20	06:54	16:32	17:07	17:45
45	05:36	06:11	06:42	16:45	17:15	17:50
40	05:32	06:04	06:32	16:55	17:23	17:55
35	05:27	05:57	06:23	17:03	17:30	17:60
30	05:23	05:51	06:16	17:11	17:36	18:04
20	05:14	05:40	06:03	17:24	17:47	18:13
10	05:04	05:29	05:51	17:36	17:58	18:23
0	04:54	05:19	05:40	17:47	18:08	18:33
-10	04:42	05:07	05:29	17:58	18:20	18:46
-20	04:27	04:54	05:17	18:10	18:33	19:01
-30	04:08	04:38	05:03	18:24	18:50	19:20
-35	03:56	04:28	04:55	18:32	18:60	19:32
-40	03:41	04:17	04:46	18:42	19:11	19:47
-45	03:22	04:03	04:35	18:53	19:25	20:06
-50	02:58	03:45	04:22	19:06	19:43	20:30
-52	02:46	03:37	04:16	19:12	19:52	20:43
-54	02:32	03:27	04:09	19:19	20:01	20:57
-56	02:15	03:17	04:01	19:27	20:12	21:15
-58	01:54	03:04	03:53	19:36	20:25	21:37
-60	01:26	02:49	03:43	19:46	20:40	22:06

Lat.	Moonrise			Moonset		
	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	–:–	17:14	–:–	–:–	21:17
70	–:–	17:11	16:34	–:–	19:44	21:56
68	16:42	16:18	16:06	18:31	20:36	22:22
66	15:41	15:45	15:45	19:32	21:09	22:42
64	15:06	15:21	15:28	20:06	21:32	22:58
62	14:41	15:01	15:14	20:31	21:51	23:12
60	14:21	14:46	15:02	20:51	22:06	23:23
58	14:05	14:32	14:52	21:07	22:19	23:32
56	13:51	14:21	14:43	21:20	22:30	23:41
54	13:39	14:10	14:35	21:32	22:40	23:48
52	13:28	14:01	14:28	21:43	22:48	23:55
50	13:19	13:53	14:21	21:52	22:56	–:–
45	12:58	13:36	14:07	22:11	23:12	–:–
40	12:42	13:22	13:56	22:27	23:26	–:–
35	12:28	13:10	13:46	22:41	23:37	–:–
30	12:16	12:59	13:37	22:52	23:47	–:–
20	11:56	12:41	13:22	23:12	–:–	00:04
10	11:38	12:25	13:09	23:29	–:–	00:19
0	11:21	12:10	12:56	23:45	–:–	00:33
-10	11:04	11:55	12:44	–:–	00:01	00:46
-20	10:46	11:39	12:31	–:–	00:18	01:01
-30	10:26	11:21	12:15	–:–	00:37	01:18
-35	10:14	11:10	12:07	00:04	00:49	01:27
-40	09:60	10:58	11:56	00:19	01:02	01:38
-45	09:43	10:43	11:44	00:35	01:17	01:51
-50	09:23	10:25	11:30	00:56	01:35	02:07
-52	09:13	10:17	11:23	01:06	01:44	02:14
-54	09:02	10:07	11:15	01:17	01:54	02:22
-56	08:49	09:57	11:07	01:30	02:05	02:31
-58	08:35	09:44	10:57	01:45	02:18	02:41
-60	08:18	09:30	10:46	02:02	02:32	02:53

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	16:27	16:27	11:43	17:33	05:07	6(41%)
4	16:27	16:27	11:43	18:21	05:57	7(51%)
5	16:26	16:26	11:43	19:07	06:44	8(60%)

November 06, 07 ,08 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	44°55.3	161°47.9	-21°39.9	204°57.7	-7°33.3	141°05.4	-23°07.9	117°48.7	-22°22.7
1	59°57.7	176°47.1	-21°40.6	219°58.7	-7°34.0	156°07.3	-23°07.9	132°50.9	-22°22.7
2	75°00.2	191°46.3	-21°41.2	234°59.6	-7°34.6	171°09.2	-23°07.9	147°53.2	-22°22.7
3	90°02.6	206°45.5	-21°41.9	250°00.5	-7°35.2	186°11.2	-23°07.9	162°55.5	-22°22.7
4	105°05.1	221°44.7	-21°42.5	265°01.5	-7°35.8	201°13.1	-23°08.0	177°57.7	-22°22.6
5	120°07.6	236°43.9	-21°43.2	280°02.4	-7°36.4	216°15.0	-23°08.0	193°00.0	-22°22.6
6	135°10.0	251°43.1	-21°43.9	295°03.4	-7°37.1	231°16.9	-23°08.0	208°02.3	-22°22.6
7	150°12.5	266°42.3	-21°44.5	310°04.3	-7°37.7	246°18.9	-23°08.0	223°04.5	-22°22.6
8	165°15.0	281°41.4	-21°45.2	325°05.3	-7°38.3	261°20.8	-23°08.1	238°06.8	-22°22.6
9	180°17.4	296°40.6	-21°45.8	340°06.2	-7°38.9	276°22.7	-23°08.1	253°09.1	-22°22.6
10	195°19.9	311°39.8	-21°46.5	355°07.1	-7°39.6	291°24.6	-23°08.1	268°11.3	-22°22.5
11	210°22.4	326°39.0	-21°47.1	10°08.1	-7°40.2	306°26.6	-23°08.1	283°13.6	-22°22.5
12	225°24.8	341°38.2	-21°47.8	25°09.0	-7°40.8	321°28.5	-23°08.2	298°15.9	-22°22.5
13	240°27.3	356°37.4	-21°48.4	40°10.0	-7°41.4	336°30.4	-23°08.2	313°18.1	-22°22.5
14	255°29.8	11°36.6	-21°49.1	55°10.9	-7°42.1	351°32.3	-23°08.2	328°20.4	-22°22.5
15	270°32.2	26°35.8	-21°49.7	70°11.8	-7°42.7	6°34.3	-23°08.2	343°22.6	-22°22.4
16	285°34.7	41°35.0	-21°50.4	85°12.8	-7°43.3	21°36.2	-23°08.3	358°24.9	-22°22.4
17	300°37.1	56°34.2	-21°51.0	100°13.7	-7°43.9	36°38.1	-23°08.3	13°27.2	-22°22.4
18	315°39.6	71°33.4	-21°51.7	115°14.7	-7°44.6	51°40.0	-23°08.3	28°29.4	-22°22.4
19	330°42.1	86°32.6	-21°52.3	130°15.6	-7°45.2	66°42.0	-23°08.3	43°31.7	-22°22.4
20	345°44.5	101°31.7	-21°53.0	145°16.5	-7°45.8	81°43.9	-23°08.4	58°34.0	-22°22.4
21	0°47.0	116°30.9	-21°53.6	160°17.5	-7°46.4	96°45.8	-23°08.4	73°36.2	-22°22.3
22	15°49.5	131°30.1	-21°54.3	175°18.4	-7°47.0	111°47.7	-23°08.4	88°38.5	-22°22.3
23	30°51.9	146°29.3	-21°54.9	190°19.4	-7°47.7	126°49.6	-23°08.4	103°40.7	-22°22.3
Mer.pass.:20:56		v-0.8 d-0.7 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.3 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	45°54.4	161°28.5	-21°55.5	205°20.3	-7°48.3	141°51.6	-23°08.5	118°43.0	-22°22.3
1	60°56.9	176°27.7	-21°56.2	220°21.2	-7°48.9	156°53.5	-23°08.5	133°45.3	-22°22.3
2	75°59.3	191°26.9	-21°56.8	235°22.2	-7°49.5	171°55.4	-23°08.5	148°47.5	-22°22.2
3	91°01.8	206°26.1	-21°57.4	250°23.1	-7°50.2	186°57.3	-23°08.6	163°49.8	-22°22.2
4	106°04.3	221°25.2	-21°58.1	265°24.1	-7°50.8	201°59.3	-23°08.6	178°52.1	-22°22.2
5	121°06.7	236°24.4	-21°58.7	280°25.0	-7°51.4	217°01.2	-23°08.6	193°54.3	-22°22.2
6	136°09.2	251°23.6	-21°59.3	295°25.9	-7°52.0	232°03.1	-23°08.6	208°56.6	-22°22.2
7	151°11.6	266°22.8	-21°60.0	310°26.9	-7°52.6	247°05.0	-23°08.7	223°58.8	-22°22.2
8	166°14.1	281°22.0	-22°00.6	325°27.8	-7°53.3	262°06.9	-23°08.7	239°01.1	-22°22.1
9	181°16.6	296°21.2	-22°01.2	340°28.8	-7°53.9	277°08.9	-23°08.7	254°03.4	-22°22.1
10	196°19.0	311°20.3	-22°01.9	355°29.7	-7°54.5	292°10.8	-23°08.7	269°05.6	-22°22.1
11	211°21.5	326°19.5	-22°02.5	10°30.6	-7°55.1	307°12.7	-23°08.8	284°07.9	-22°22.1
12	226°24.0	341°18.7	-22°03.1	25°31.6	-7°55.7	322°14.6	-23°08.8	299°10.1	-22°22.1
13	241°26.4	356°17.9	-22°03.7	40°32.5	-7°56.4	337°16.5	-23°08.8	314°12.4	-22°22.0
14	256°28.9	11°17.1	-22°04.4	55°33.5	-7°57.0	352°18.5	-23°08.8	329°14.7	-22°22.0
15	271°31.4	26°16.2	-22°05.0	70°34.4	-7°57.6	7°20.4	-23°08.9	344°16.9	-22°22.0
16	286°33.8	41°15.4	-22°05.6	85°35.3	-7°58.2	22°22.3	-23°08.9	359°19.2	-22°22.0
17	301°36.3	56°14.6	-22°06.2	100°36.3	-7°58.9	37°24.2	-23°08.9	14°21.4	-22°22.0
18	316°38.7	71°13.8	-22°06.9	115°37.2	-7°59.5	52°26.1	-23°08.9	29°23.7	-22°21.9
19	331°41.2	86°13.0	-22°07.5	130°38.1	-8°00.1	67°28.1	-23°09.0	44°26.0	-22°21.9
20	346°43.7	101°12.1	-22°08.1	145°39.1	-8°00.7	82°30.0	-23°09.0	59°28.2	-22°21.9
21	1°46.1	116°11.3	-22°08.7	160°40.0	-8°01.3	97°31.9	-23°09.0	74°30.5	-22°21.9
22	16°48.6	131°10.5	-22°09.3	175°41.0	-8°02.0	112°33.8	-23°09.0	89°32.7	-22°21.9
23	31°51.1	146°09.7	-22°09.9	190°41.9	-8°02.6	127°35.7	-23°09.1	104°35.0	-22°21.9
Mer.pass.:20:52		v-0.8 d-0.6 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.3 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	46°53.5	161°08.8	-22°10.6	205°42.8	-8°03.2	142°37.7	-23°09.1	119°37.3	-22°21.8
1	61°56.0	176°08.0	-22°11.2	220°43.8	-8°03.8	157°39.6	-23°09.1	134°39.5	-22°21.8
2	76°58.5	191°07.2	-22°11.8	235°44.7	-8°04.4	172°41.5	-23°09.1	149°41.8	-22°21.8
3	92°00.9	206°06.4	-22°12.4	250°45.6	-8°05.1	187°43.4	-23°09.1	164°44.0	-22°21.8
4	107°03.4	221°05.5	-22°13.0	265°46.6	-8°05.7	202°45.3	-23°09.2	179°46.3	-22°21.8
5	122°05.9	236°04.7	-22°13.6	280°47.5	-8°06.3	217°47.3	-23°09.2	194°48.5	-22°21.7
6	137°08.3	251°03.9	-22°14.2	295°48.5	-8°06.9	232°49.2	-23°09.2	209°50.8	-22°21.7
7	152°10.8	266°03.1	-22°14.8	310°49.4	-8°07.5	247°51.1	-23°09.2	224°53.1	-22°21.7
8	167°13.2	281°02.2	-22°15.4	325°50.3	-8°08.2	262°53.0	-23°09.3	239°55.3	-22°21.7
9	182°15.7	296°01.4	-22°16.0	340°51.3	-8°08.8	277°54.9	-23°09.3	254°57.6	-22°21.7
10	197°18.2	311°00.6	-22°16.6	355°52.2	-8°09.4	292°56.8	-23°09.3	269°59.8	-22°21.6
11	212°20.6	325°59.7	-22°17.2	10°53.1	-8°10.0	307°58.8	-23°09.3	285°02.1	-22°21.6
12	227°23.1	340°58.9	-22°17.8	25°54.1	-8°10.6	323°00.7	-23°09.4	300°04.4	-22°21.6
13	242°25.6	355°58.1	-22°18.4	40°55.0	-8°11.3	338°02.6	-23°09.4	315°06.6	-22°21.6
14	257°28.0	10°57.3	-22°19.0	55°55.9	-8°11.9	353°04.5	-23°09.4	330°08.9	-22°21.6
15	272°30.5	25°56.4	-22°19.6	70°56.9	-8°12.5	8°06.4	-23°09.4	345°11.1	-22°21.5
16	287°33.0	40°55.6	-22°20.2	85°57.8	-8°13.1	23°08.3	-23°09.5	0°13.4	-22°21.5
17	302°35.4	55°54.8	-22°20.8	100°58.7	-8°13.7	38°10.3	-23°09.5	15°15.6	-22°21.5
18	317°37.9	70°53.9	-22°21.4	115°59.7	-8°14.3	53°12.2	-23°09.5	30°17.9	-22°21.5
19	332°40.3	85°53.1	-22°22.0	131°00.6	-8°15.0	68°14.1	-23°09.5	45°20.1	-22°21.5
20	347°42.8	100°52.3	-22°22.6	146°01.6	-8°15.6	83°16.0	-23°09.6	60°22.4	-22°21.4
21	2°45.3	115°51.4	-22°23.2	161°02.5	-8°16.2	98°17.9	-23°09.6	75°24.7	-22°21.4
22	17°47.7	130°50.6	-22°23.8	176°03.4	-8°16.8	113°19.8	-23°09.6	90°26.9	-22°21.4
23	32°50.2	145°49.8	-22°24.4	191°04.4	-8°17.4	128°21.8	-23°09.6	105°29.2	-22°21.4
Mer.pass.:20:49		v-0.8 d-0.6 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.3 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.0	-42°12.1
Schedar	349°35.1	56°38.9
Diphda	348°51.1	-17°52.8
Achernar	335°22.9	-57°08.4
Hamal	327°55.5	23°33.4
Polaris	315°24.3	89°20.8
Akamar	315°14.6	-40°13.6
Menkar	314°10.2	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.1	16°32.9
Rigel	281°07.6	-8°10.7
Capella	280°27.6	46°00.9
Bellatrix	278°27.1	6°22.0
Elnath	278°06.8	28°37.3
Alnilam	275°41.7	-1°11.4
Betelgeuse	270°56.3	7°24.6
Canopus	263°53.9	-52°42.2
Sirius	258°29.6	-16°44.3
Adara	255°08.9	-28°59.8
Procyon	244°55.0	5°10.6
Pollux	243°22.2	27°58.6
Avior	234°16.2	-59°34.1
Suhail	222°49.3	-43°30.4
Miaplacidus	221°38.9	-69°47.5
Alphard	217°51.8	-8°44.5
Regulus	207°38.9	11°52.3
Dubhe	193°46.6	61°38.5
Denebola	182°29.4	14°27.8
Gienah	175°48.0	-17°38.8
Acrux	173°05.0	-63°12.2
Gacrux	171°56.5	-57°13.1
Alioth	166°17.3	55°51.2
Spica	158°27.0	-11°15.6
Alcaid	152°55.9	49°13.0
Hadar	148°42.4	-60°27.8
Menkent	148°02.9	-36°27.8
Arcturus	145°51.9	19°05.3
Rigil Kent.	139°46.5	-60°54.8
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.6
Alphecca	126°07.7	26°39.1
Antares	112°21.2	-26°28.4
Atria	107°19.6	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.5	51°29.5
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.5	-56°40.4
Deneb	49°28.6	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.1	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.0	28°11.5
Markab	13°33.9	15°18.8

2019/11/	**SHA**	**Mer.pass**
Venus	116°52.6	13:14
Mars	160°02.5	10:20
Jupiter	96°10.1	14:34
Saturn	72°53.4	16:06

2019/11/	**SHA**	**Mer.pass**
Venus	115°34.1	13:15
Mars	159°25.9	10:18
Jupiter	95°57.2	14:31
Saturn	72°48.6	16:03

2019/11/	**SHA**	**Mer.pass**
Venus	114°15.3	13:16
Mars	158°49.3	10:17
Jupiter	95°44.1	14:28
Saturn	72°43.7	15:59

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°06.2	-15°49.2	70°59.6	14.2	-14°59.0	9.0	54.3
1	199°06.2	-15°50.0	85°32.8	14.3	-14°49.9	9.1	54.3
2	214°06.2	-15°50.7	100°06.1	14.3	-14°40.8	9.1	54.3
3	229°06.2	-15°51.5	114°39.5	14.4	-14°31.7	9.2	54.3
4	244°06.1	-15°52.2	129°12.9	14.4	-14°22.4	9.3	54.2
5	259°06.1	-15°53.0	143°46.3	14.5	-14°13.1	9.3	54.2
6	274°06.1	-15°53.7	158°19.8	14.5	-14°03.8	9.4	54.2
7	289°06.1	-15°54.5	172°53.4	14.6	-13°54.4	9.4	54.2
8	304°06.1	-15°55.2	187°26.9	14.6	-13°45.0	9.5	54.2
9	319°06.0	-15°56.0	202°00.6	14.7	-13°35.5	9.5	54.2
10	334°06.0	-15°56.7	216°34.2	14.7	-13°25.9	9.6	54.2
11	349°06.0	-15°57.5	231°08.0	14.7	-13°16.3	9.6	54.2
12	4°06.0	-15°58.2	245°41.7	14.8	-13°06.6	9.7	54.2
13	19°05.9	-15°59.0	260°15.5	14.8	-12°56.9	9.7	54.2
14	34°05.9	-15°59.7	274°49.3	14.9	-12°47.1	9.8	54.2
15	49°05.9	-16°00.5	289°23.2	14.9	-12°37.3	9.8	54.2
16	64°05.9	-16°01.2	303°57.2	14.9	-12°27.5	9.9	54.2
17	79°05.8	-16°02.0	318°31.1	15.0	-12°17.5	9.9	54.2
18	94°05.8	-16°02.7	333°05.1	15.0	-12°07.6	10.0	54.2
19	109°05.8	-16°03.5	347°39.1	15.1	-11°57.6	10.0	54.2
20	124°05.8	-16°04.2	2°13.2	15.1	-11°47.5	10.1	54.2
21	139°05.7	-16°05.0	16°47.3	15.1	-11°37.4	10.1	54.2
22	154°05.7	-16°05.7	31°21.5	15.2	-11°27.3	10.2	54.1
23	169°05.7	-16°06.4	45°55.7	15.2	-11°17.1	10.2	54.1
	SD.=16.1	d=-0.8			S.D.=14.8		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°05.6	-16°07.2	60°29.9	15.2	-11°06.8	10.3	54.1
1	199°05.6	-16°07.9	75°04.1	15.3	-10°56.5	10.3	54.1
2	214°05.6	-16°08.7	89°38.4	15.3	-10°46.2	10.3	54.1
3	229°05.6	-16°09.4	104°12.7	15.3	-10°35.8	10.4	54.1
4	244°05.5	-16°10.2	118°47.1	15.4	-10°25.4	10.4	54.1
5	259°05.5	-16°10.9	133°21.4	15.4	-10°15.0	10.5	54.1
6	274°05.5	-16°11.6	147°55.8	15.4	-10°04.5	10.5	54.1
7	289°05.4	-16°12.4	162°30.3	15.4	-9°54.0	10.6	54.1
8	304°05.4	-16°13.1	177°04.7	15.5	-9°43.4	10.6	54.1
9	319°05.4	-16°13.9	191°39.2	15.5	-9°32.8	10.6	54.1
10	334°05.3	-16°14.6	206°13.7	15.5	-9°22.1	10.7	54.1
11	349°05.3	-16°15.3	220°48.3	15.6	-9°11.4	10.7	54.1
12	4°05.3	-16°16.1	235°22.8	15.6	-9°00.7	10.7	54.1
13	19°05.2	-16°16.8	249°57.4	15.6	-8°49.9	10.8	54.1
14	34°05.2	-16°17.5	264°32.0	15.6	-8°39.1	10.8	54.1
15	49°05.2	-16°18.3	279°06.7	15.6	-8°28.3	10.9	54.1
16	64°05.1	-16°19.0	293°41.3	15.7	-8°17.4	10.9	54.1
17	79°05.1	-16°19.8	308°16.0	15.7	-8°06.5	10.9	54.1
18	94°05.1	-16°20.5	322°50.7	15.7	-7°55.6	11.0	54.1
19	109°05.0	-16°21.2	337°25.4	15.7	-7°44.6	11.0	54.1
20	124°05.0	-16°22.0	352°00.2	15.7	-7°33.6	11.0	54.1
21	139°05.0	-16°22.7	6°34.9	15.8	-7°22.6	11.0	54.2
22	154°04.9	-16°23.4	21°09.7	15.8	-7°11.5	11.1	54.2
23	169°04.9	-16°24.2	35°44.5	15.8	-7°00.4	11.1	54.2
	SD.=16.1	d=-0.7			S.D.=14.8		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°04.9	-16°24.9	50°19.3	15.8	-6°49.3	11.1	54.2
1	199°04.8	-16°25.6	64°54.1	15.8	-6°38.2	11.2	54.2
2	214°04.8	-16°26.4	79°29.0	15.8	-6°27.0	11.2	54.2
3	229°04.7	-16°27.1	94°03.8	15.9	-6°15.8	11.2	54.2
4	244°04.7	-16°27.8	108°38.7	15.9	-6°04.6	11.2	54.2
5	259°04.7	-16°28.5	123°13.6	15.9	-5°53.3	11.3	54.2
6	274°04.6	-16°29.3	137°48.5	15.9	-5°42.0	11.3	54.2
7	289°04.6	-16°30.0	152°23.4	15.9	-5°30.7	11.3	54.2
8	304°04.5	-16°30.7	166°58.3	15.9	-5°19.4	11.3	54.2
9	319°04.5	-16°31.5	181°33.2	15.9	-5°08.0	11.4	54.2
10	334°04.5	-16°32.2	196°08.1	15.9	-4°56.6	11.4	54.2
11	349°04.4	-16°32.9	210°43.0	15.9	-4°45.2	11.4	54.2
12	4°04.4	-16°33.6	225°18.0	15.9	-4°33.8	11.4	54.2
13	19°04.3	-16°34.4	239°52.9	15.9	-4°22.3	11.5	54.2
14	34°04.3	-16°35.1	254°27.9	15.9	-4°10.8	11.5	54.2
15	49°04.3	-16°35.8	269°02.8	16.0	-3°59.3	11.5	54.2
16	64°04.2	-16°36.5	283°37.8	16.0	-3°47.8	11.5	54.3
17	79°04.2	-16°37.3	298°12.7	16.0	-3°36.3	11.5	54.3
18	94°04.1	-16°38.0	312°47.7	16.0	-3°24.8	11.6	54.3
19	109°04.1	-16°38.7	327°22.6	16.0	-3°13.2	11.6	54.3
20	124°04.0	-16°39.4	341°57.6	16.0	-3°01.6	11.6	54.3
21	139°04.0	-16°40.2	356°32.6	16.0	-2°50.0	11.6	54.3
22	154°04.0	-16°40.9	11°07.5	16.0	-2°38.4	11.6	54.3
23	169°03.9	-16°41.6	25°42.5	16.0	-2°26.7	11.6	54.3
	SD.=16.1	d=-0.7			S.D.=14.8		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:28	07:55	09:35	13:51	15:31	16:57
70	06:22	07:39	08:60	14:26	15:47	17:04
68	06:16	07:25	08:35	14:51	16:01	17:10
66	06:11	07:14	08:16	15:10	16:12	17:15
64	06:07	07:05	08:00	15:26	16:21	17:19
62	06:03	06:57	07:48	15:39	16:29	17:23
60	05:60	06:50	07:37	15:50	16:36	17:27
58	05:57	06:44	07:27	15:59	16:43	17:30
56	05:54	06:38	07:19	16:08	16:48	17:33
54	05:51	06:33	07:12	16:15	16:53	17:36
52	05:48	06:29	07:05	16:22	16:58	17:38
50	05:46	06:24	06:59	16:28	17:02	17:41
45	05:40	06:15	06:46	16:41	17:12	17:47
40	05:35	06:07	06:35	16:51	17:20	17:52
35	05:30	05:60	06:26	17:01	17:27	17:57
30	05:25	05:53	06:18	17:09	17:34	18:02
20	05:15	05:41	06:04	17:23	17:46	18:12
10	05:05	05:30	05:52	17:35	17:57	18:22
0	04:54	05:19	05:40	17:47	18:09	18:34
-10	04:41	05:06	05:28	17:59	18:21	18:47
-20	04:25	04:52	05:16	18:12	18:35	19:03
-30	04:05	04:35	05:01	18:27	18:52	19:23
-35	03:52	04:25	04:52	18:35	19:03	19:36
-40	03:37	04:13	04:43	18:45	19:15	19:51
-45	03:17	03:58	04:31	18:57	19:30	20:11
-50	02:52	03:40	04:17	19:11	19:49	20:37
-52	02:39	03:31	04:10	19:18	19:58	20:51
-54	02:23	03:21	04:03	19:25	20:08	21:06
-56	02:05	03:09	03:55	19:34	20:20	21:25
-58	01:41	02:56	03:46	19:43	20:34	21:50
-60	01:07	02:40	03:35	19:54	20:50	22:26

Lat.	Moonrise			Moonset		
	Wed	Thu	Fri	Wed	Thu	Fri
72	16:36	16:13	15:54	23:25	–:–	01:16
70	16:15	16:01	15:49	23:45	–:–	01:26
68	15:58	15:51	15:44	–:–	00:01	01:35
66	15:44	15:43	15:41	–:–	00:13	01:41
64	15:33	15:36	15:38	–:–	00:23	01:47
62	15:23	15:30	15:35	–:–	00:32	01:52
60	15:15	15:24	15:32	–:–	00:40	01:56
58	15:07	15:20	15:30	–:–	00:46	01:60
56	15:01	15:15	15:28	–:–	00:52	02:03
54	14:55	15:12	15:27	–:–	00:57	02:06
52	14:50	15:08	15:25	–:–	01:02	02:09
50	14:45	15:05	15:24	00:01	01:06	02:11
45	14:34	14:58	15:21	00:14	01:15	02:16
40	14:26	14:53	15:18	00:25	01:23	02:21
35	14:18	14:48	15:16	00:34	01:29	02:24
30	14:12	14:43	15:14	00:42	01:35	02:28
20	14:00	14:36	15:10	00:55	01:45	02:33
10	13:50	14:29	15:07	01:07	01:53	02:38
0	13:41	14:23	15:04	01:18	02:01	02:43
-10	13:31	14:17	15:01	01:29	02:09	02:47
-20	13:21	14:10	14:58	01:41	02:17	02:52
-30	13:09	14:02	14:55	01:54	02:27	02:58
-35	13:02	13:58	14:53	02:01	02:32	03:01
-40	12:55	13:53	14:50	02:10	02:38	03:04
-45	12:46	13:47	14:48	02:20	02:46	03:09
-50	12:35	13:40	14:45	02:32	02:54	03:13
-52	12:30	13:36	14:43	02:38	02:58	03:16
-54	12:24	13:33	14:42	02:44	03:02	03:18
-56	12:18	13:29	14:40	02:51	03:07	03:21
-58	12:11	13:24	14:38	02:59	03:12	03:24
-60	12:03	13:19	14:36	03:07	03:18	03:27

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	16:25	16:24	11:43	19:50	07:29	9(69%)
7	16:23	16:21	11:43	20:32	08:12	10(78%)
8	16:19	16:18	11:43	21:14	08:53	11(85%)

November 09, 10 ,11 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	47°52.7	160°48.9	-22°24.9	206°05.3	-8°18.1	143°23.7	-23°09.7	120°31.4	-22°21.4
1	62°55.1	175°48.1	-22°25.5	221°06.2	-8°18.7	158°25.6	-23°09.7	135°33.7	-22°21.4
2	77°57.6	190°47.2	-22°26.1	236°07.2	-8°19.3	173°27.5	-23°09.7	150°35.9	-22°21.3
3	93°00.1	205°46.4	-22°26.7	251°08.1	-8°19.9	188°29.4	-23°09.7	165°38.2	-22°21.3
4	108°02.5	220°45.6	-22°27.3	266°09.0	-8°20.5	203°31.3	-23°09.8	180°40.4	-22°21.3
5	123°05.0	235°44.7	-22°27.9	281°10.0	-8°21.1	218°33.3	-23°09.8	195°42.7	-22°21.3
6	138°07.5	250°43.9	-22°28.4	296°10.9	-8°21.8	233°35.2	-23°09.8	210°45.0	-22°21.3
7	153°09.9	265°43.1	-22°29.0	311°11.8	-8°22.4	248°37.1	-23°09.8	225°47.2	-22°21.2
8	168°12.4	280°42.2	-22°29.6	326°12.8	-8°23.0	263°39.0	-23°09.9	240°49.5	-22°21.2
9	183°14.8	295°41.4	-22°30.2	341°13.7	-8°23.6	278°40.9	-23°09.9	255°51.7	-22°21.2
10	198°17.3	310°40.5	-22°30.7	356°14.6	-8°24.2	293°42.8	-23°09.9	270°54.0	-22°21.2
11	213°19.8	325°39.7	-22°31.3	11°15.6	-8°24.9	308°44.7	-23°09.9	285°56.2	-22°21.2
12	228°22.2	340°38.9	-22°31.9	26°16.5	-8°25.5	323°46.7	-23°09.9	300°58.5	-22°21.1
13	243°24.7	355°38.0	-22°32.5	41°17.4	-8°26.1	338°48.6	-23°10.0	316°00.7	-22°21.1
14	258°27.2	10°37.2	-22°33.0	56°18.4	-8°26.7	353°50.5	-23°10.0	331°03.0	-22°21.1
15	273°29.6	25°36.3	-22°33.6	71°19.3	-8°27.3	8°52.4	-23°10.0	346°05.2	-22°21.1
16	288°32.1	40°35.5	-22°34.2	86°20.2	-8°27.9	23°54.3	-23°10.0	1°07.5	-22°21.1
17	303°34.6	55°34.7	-22°34.7	101°21.2	-8°28.6	38°56.2	-23°10.1	16°09.8	-22°21.0
18	318°37.0	70°33.8	-22°35.3	116°22.1	-8°29.2	53°58.1	-23°10.1	31°12.0	-22°21.0
19	333°39.5	85°33.0	-22°35.9	131°23.0	-8°29.8	69°00.1	-23°10.1	46°14.3	-22°21.0
20	348°41.9	100°32.1	-22°36.4	146°24.0	-8°30.4	84°02.0	-23°10.1	61°16.5	-22°21.0
21	3°44.4	115°31.3	-22°37.0	161°24.9	-8°31.0	99°03.9	-23°10.2	76°18.8	-22°21.0
22	18°46.9	130°30.4	-22°37.6	176°25.8	-8°31.6	114°05.8	-23°10.2	91°21.0	-22°20.9
23	33°49.3	145°29.6	-22°38.1	191°26.8	-8°32.3	129°07.7	-23°10.2	106°23.3	-22°20.9
Mer.pass.:20:45		v-0.8 d-0.6 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.3 d0.0 m0.6	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	48°51.8	160°28.7	-22°38.7	206°27.7	-8°32.9	144°09.6	-23°10.2	121°25.5	-22°20.9
1	63°54.3	175°27.9	-22°39.2	221°28.6	-8°33.5	159°11.5	-23°10.3	136°27.8	-22°20.9
2	78°56.7	190°27.0	-22°39.8	236°29.6	-8°34.1	174°13.4	-23°10.3	151°30.0	-22°20.9
3	93°59.2	205°26.2	-22°40.4	251°30.5	-8°34.7	189°15.4	-23°10.3	166°32.3	-22°20.8
4	109°01.7	220°25.4	-22°40.9	266°31.4	-8°35.3	204°17.3	-23°10.3	181°34.5	-22°20.8
5	124°04.1	235°24.5	-22°41.5	281°32.3	-8°35.9	219°19.2	-23°10.3	196°36.8	-22°20.8
6	139°06.6	250°23.7	-22°42.0	296°33.3	-8°36.6	234°21.1	-23°10.4	211°39.0	-22°20.8
7	154°09.1	265°22.8	-22°42.6	311°34.2	-8°37.2	249°23.0	-23°10.4	226°41.3	-22°20.8
8	169°11.5	280°22.0	-22°43.1	326°35.1	-8°37.8	264°24.9	-23°10.4	241°43.5	-22°20.7
9	184°14.0	295°21.1	-22°43.7	341°36.1	-8°38.4	279°26.8	-23°10.4	256°45.8	-22°20.7
10	199°16.4	310°20.3	-22°44.2	356°37.0	-8°39.0	294°28.7	-23°10.5	271°48.0	-22°20.7
11	214°18.9	325°19.4	-22°44.8	11°37.9	-8°39.6	309°30.6	-23°10.5	286°50.3	-22°20.7
12	229°21.4	340°18.6	-22°45.3	26°38.9	-8°40.3	324°32.6	-23°10.5	301°52.5	-22°20.7
13	244°23.8	355°17.7	-22°45.9	41°39.8	-8°40.9	339°34.5	-23°10.5	316°54.8	-22°20.6
14	259°26.3	10°16.9	-22°46.4	56°40.7	-8°41.5	354°36.4	-23°10.6	331°57.0	-22°20.6
15	274°28.8	25°16.0	-22°46.9	71°41.7	-8°42.1	9°38.3	-23°10.6	346°59.3	-22°20.6
16	289°31.2	40°15.2	-22°47.5	86°42.6	-8°42.7	24°40.2	-23°10.6	2°01.5	-22°20.6
17	304°33.7	55°14.3	-22°48.0	101°43.5	-8°43.3	39°42.1	-23°10.6	17°03.8	-22°20.6
18	319°36.2	70°13.4	-22°48.6	116°44.4	-8°43.9	54°44.0	-23°10.6	32°06.0	-22°20.5
19	334°38.6	85°12.6	-22°49.1	131°45.4	-8°44.6	69°45.9	-23°10.7	47°08.3	-22°20.5
20	349°41.1	100°11.7	-22°49.6	146°46.3	-8°45.2	84°47.8	-23°10.7	62°10.5	-22°20.5
21	4°43.6	115°10.9	-22°50.2	161°47.2	-8°45.8	99°49.8	-23°10.7	77°12.8	-22°20.5
22	19°46.0	130°10.0	-22°50.7	176°48.2	-8°46.4	114°51.7	-23°10.7	92°15.0	-22°20.5
23	34°48.5	145°09.2	-22°51.2	191°49.1	-8°47.0	129°53.6	-23°10.8	107°17.3	-22°20.4
Mer.pass.:20:41		v-0.8 d-0.6 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.3 d0.0 m0.6	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	49°50.9	160°08.3	-22°51.8	206°50.0	-8°47.6	144°55.5	-23°10.8	122°19.5	-22°20.4
1	64°53.4	175°07.5	-22°52.3	221°50.9	-8°48.2	159°57.4	-23°10.8	137°21.8	-22°20.4
2	79°55.9	190°06.6	-22°52.8	236°51.9	-8°48.8	174°59.3	-23°10.8	152°24.0	-22°20.4
3	94°58.3	205°05.7	-22°53.4	251°52.8	-8°49.5	190°01.2	-23°10.8	167°26.3	-22°20.4
4	110°00.8	220°04.9	-22°53.9	266°53.7	-8°50.1	205°03.1	-23°10.9	182°28.5	-22°20.3
5	125°03.3	235°04.0	-22°54.4	281°54.7	-8°50.7	220°05.0	-23°10.9	197°30.8	-22°20.3
6	140°05.7	250°03.2	-22°54.9	296°55.6	-8°51.3	235°06.9	-23°10.9	212°33.0	-22°20.3
7	155°08.2	265°02.3	-22°55.5	311°56.5	-8°51.9	250°08.8	-23°10.9	227°35.3	-22°20.3
8	170°10.7	280°01.5	-22°56.0	326°57.4	-8°52.5	265°10.8	-23°11.0	242°37.5	-22°20.2
9	185°13.1	295°00.6	-22°56.5	341°58.4	-8°53.1	280°12.7	-23°11.0	257°39.8	-22°20.2
10	200°15.6	309°59.7	-22°57.0	356°59.3	-8°53.8	295°14.6	-23°11.0	272°42.0	-22°20.2
11	215°18.0	324°58.9	-22°57.6	12°00.2	-8°54.4	310°16.5	-23°11.0	287°44.3	-22°20.2
12	230°20.5	339°58.0	-22°58.1	27°01.2	-8°55.0	325°18.4	-23°11.0	302°46.5	-22°20.2
13	245°23.0	354°57.1	-22°58.6	42°02.1	-8°55.6	340°20.3	-23°11.1	317°48.8	-22°20.1
14	260°25.4	9°56.3	-22°59.1	57°03.0	-8°56.2	355°22.2	-23°11.1	332°51.0	-22°20.1
15	275°27.9	24°55.4	-22°59.6	72°03.9	-8°56.8	10°24.1	-23°11.1	347°53.3	-22°20.1
16	290°30.4	39°54.6	-23°00.1	87°04.9	-8°57.4	25°26.0	-23°11.1	2°55.5	-22°20.1
17	305°32.8	54°53.7	-23°00.6	102°05.8	-8°58.0	40°27.9	-23°11.2	17°57.8	-22°20.1
18	320°35.3	69°52.8	-23°01.2	117°06.7	-8°58.7	55°29.8	-23°11.2	33°00.0	-22°20.0
19	335°37.8	84°52.0	-23°01.7	132°07.6	-8°59.3	70°31.7	-23°11.2	48°02.2	-22°20.0
20	350°40.2	99°51.1	-23°02.2	147°08.6	-8°59.9	85°33.6	-23°11.2	63°04.5	-22°20.0
21	5°42.7	114°50.2	-23°02.7	162°09.5	-9°00.5	100°35.6	-23°11.2	78°06.7	-22°20.0
22	20°45.2	129°49.4	-23°03.2	177°10.4	-9°01.1	115°37.5	-23°11.3	93°09.0	-22°20.0
23	35°47.6	144°48.5	-23°03.7	192°11.4	-9°01.7	130°39.4	-23°11.3	108°11.2	-22°19.9
Mer.pass.:20:37		v-0.9 d-0.5 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.0	-42°12.1
Schedar	349°35.1	56°38.9
Diphda	348°51.1	-17°52.8
Achernar	335°22.9	-57°08.4
Hamal	327°55.5	23°33.4
Polaris	315°24.2	89°20.8
Akamar	315°14.6	-40°13.6
Menkar	314°10.2	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.1	16°32.9
Rigel	281°07.6	-8°10.7
Capella	280°27.6	46°00.9
Bellatrix	278°27.0	6°22.0
Elnath	278°06.8	28°37.3
Alnilam	275°41.7	-1°11.4
Betelgeuse	270°56.3	7°24.6
Canopus	263°53.8	-52°42.2
Sirius	258°29.6	-16°44.3
Adara	255°08.9	-28°59.8
Procyon	244°54.9	5°10.6
Pollux	243°22.2	27°58.6
Avior	234°16.1	-59°34.1
Suhail	222°49.2	-43°30.4
Miaplacidus	221°38.8	-69°47.5
Alphard	217°51.8	-8°44.5
Regulus	207°38.9	11°52.3
Dubhe	193°46.6	61°38.5
Denebola	182°29.3	14°27.8
Gienah	175°48.0	-17°38.8
Acrux	173°05.0	-63°12.2
Gacrux	171°56.5	-57°13.1
Alioth	166°17.3	55°51.1
Spica	158°26.9	-11°15.6
Alcaid	152°55.9	49°13.0
Hadar	148°42.3	-60°27.8
Menkent	148°02.8	-36°27.7
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.5	-60°54.7
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.5
Alphecca	126°07.7	26°39.1
Antares	112°21.3	-26°28.4
Atria	107°19.7	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.5	51°29.5
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.1	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.5	-56°40.4
Deneb	49°28.6	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.2	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.0	28°11.5
Markab	13°33.9	15°18.8

2019/11/	SHA	Mer.pass
Venus	112°56.3	13:17
Mars	158°12.6	10:15
Jupiter	95°31.0	14:25
Saturn	72°38.8	15:56

2019/11/	SHA	Mer.pass
Venus	111°36.9	13:19
Mars	157°35.9	10:14
Jupiter	95°17.8	14:22
Saturn	72°33.7	15:52

2019/11/	SHA	Mer.pass
Venus	110°17.4	13:20
Mars	156°59.1	10:12
Jupiter	95°04.5	14:18
Saturn	72°28.6	15:48

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°03.9	-16°42.3	40°17.4	15.9	-2°15.1	11.7	54.3
1	199°03.8	-16°43.0	54°52.4	15.9	-2°03.4	11.7	54.3
2	214°03.8	-16°43.8	69°27.3	15.9	-1°51.8	11.7	54.3
3	229°03.7	-16°44.5	84°02.2	15.9	-1°40.1	11.7	54.4
4	244°03.7	-16°45.2	98°37.2	15.9	-1°28.4	11.7	54.4
5	259°03.6	-16°45.9	113°12.1	15.9	-1°16.7	11.7	54.4
6	274°03.6	-16°46.6	127°47.0	15.9	-1°04.9	11.7	54.4
7	289°03.5	-16°47.3	142°21.9	15.9	-0°53.2	11.7	54.4
8	304°03.5	-16°48.1	156°56.8	15.9	-0°41.5	11.7	54.4
9	319°03.4	-16°48.8	171°31.6	15.9	-0°29.7	11.8	54.4
10	334°03.4	-16°49.5	186°06.5	15.9	-0°18.0	11.8	54.4
11	349°03.3	-16°50.2	200°41.4	15.8	-0°06.2	11.8	54.4
12	4°03.3	-16°50.9	215°16.2	15.8	0°05.6	11.8	54.4
13	19°03.2	-16°51.6	229°51.0	15.8	0°17.3	11.8	54.5
14	34°03.2	-16°52.4	244°25.9	15.8	0°29.1	11.8	54.5
15	49°03.1	-16°53.1	259°00.6	15.8	0°40.9	11.8	54.5
16	64°03.1	-16°53.8	273°35.4	15.8	0°52.7	11.8	54.5
17	79°03.0	-16°54.5	288°10.2	15.8	1°04.5	11.8	54.5
18	94°03.0	-16°55.2	302°44.9	15.7	1°16.3	11.8	54.5
19	109°02.9	-16°55.9	317°19.7	15.7	1°28.1	11.8	54.5
20	124°02.9	-16°56.6	331°54.4	15.7	1°39.9	11.8	54.5
21	139°02.8	-16°57.3	346°29.0	15.7	1°51.7	11.8	54.6
22	154°02.8	-16°58.0	1°03.7	15.7	2°03.5	11.8	54.6
23	169°02.7	-16°58.8	15°38.4	15.6	2°15.3	11.8	54.6
	SD.=16.1	d=-0.7			S.D.=14.8		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°02.7	-16°59.5	30°13.0	15.6	2°27.1	11.8	54.6
1	199°02.6	-17°00.2	44°47.6	15.6	2°38.9	11.8	54.6
2	214°02.5	-17°00.9	59°22.1	15.6	2°50.7	11.8	54.6
3	229°02.5	-17°01.6	73°56.7	15.5	3°02.4	11.8	54.6
4	244°02.4	-17°02.3	88°31.2	15.5	3°14.2	11.8	54.7
5	259°02.4	-17°03.0	103°05.7	15.5	3°26.0	11.8	54.7
6	274°02.3	-17°03.7	117°40.1	15.4	3°37.8	11.8	54.7
7	289°02.3	-17°04.4	132°14.6	15.4	3°49.5	11.8	54.7
8	304°02.2	-17°05.1	146°49.0	15.4	4°01.3	11.8	54.7
9	319°02.2	-17°05.8	161°23.3	15.4	4°13.0	11.7	54.7
10	334°02.1	-17°06.5	175°57.7	15.3	4°24.8	11.7	54.7
11	349°02.0	-17°07.2	190°32.0	15.3	4°36.5	11.7	54.8
12	4°02.0	-17°07.9	205°06.3	15.3	4°48.2	11.7	54.8
13	19°01.9	-17°08.6	219°40.5	15.2	4°59.9	11.7	54.8
14	34°01.9	-17°09.3	234°14.7	15.2	5°11.6	11.7	54.8
15	49°01.8	-17°10.0	248°48.9	15.2	5°23.3	11.7	54.8
16	64°01.7	-17°10.7	263°23.0	15.1	5°34.9	11.7	54.8
17	79°01.7	-17°11.4	277°57.1	15.1	5°46.6	11.6	54.8
18	94°01.6	-17°12.1	292°31.2	15.0	5°58.2	11.6	54.9
19	109°01.6	-17°12.8	307°05.2	15.0	6°09.8	11.6	54.9
20	124°01.5	-17°13.5	321°39.2	15.0	6°21.4	11.6	54.9
21	139°01.4	-17°14.2	336°13.1	14.9	6°33.0	11.6	54.9
22	154°01.4	-17°14.9	350°47.0	14.9	6°44.6	11.6	54.9
23	169°01.3	-17°15.6	5°20.9	14.8	6°56.1	11.5	54.9
	SD.=16.1	d=-0.7			S.D.=14.9		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	184°01.2	-17°16.3	19°54.7	14.8	7°07.7	11.5	55.0
1	199°01.2	-17°17.0	34°28.5	14.8	7°19.2	11.5	55.0
2	214°01.1	-17°17.7	49°02.2	14.7	7°30.6	11.5	55.0
3	229°01.1	-17°18.4	63°35.9	14.7	7°42.1	11.4	55.0
4	244°01.0	-17°19.1	78°09.6	14.6	7°53.5	11.4	55.0
5	259°00.9	-17°19.8	92°43.2	14.6	8°04.9	11.4	55.0
6	274°00.9	-17°20.5	107°16.7	14.5	8°16.3	11.4	55.1
7	289°00.8	-17°21.2	121°50.2	14.5	8°27.7	11.3	55.1
8	304°00.7	-17°21.9	136°23.7	14.4	8°39.0	11.3	55.1
9	319°00.7	-17°22.6	150°57.1	14.4	8°50.3	11.3	55.1
10	334°00.6	-17°23.2	165°30.5	14.3	9°01.6	11.3	55.1
11	349°00.5	-17°23.9	180°03.8	14.3	9°12.8	11.2	55.2
12	4°00.5	-17°24.6	194°37.0	14.2	9°24.0	11.2	55.2
13	19°00.4	-17°25.3	209°10.2	14.2	9°35.2	11.2	55.2
14	34°00.3	-17°26.0	223°43.4	14.1	9°46.3	11.1	55.2
15	49°00.3	-17°26.7	238°16.5	14.1	9°57.4	11.1	55.2
16	64°00.2	-17°27.4	252°49.5	14.0	10°08.5	11.1	55.2
17	79°00.1	-17°28.1	267°22.5	14.0	10°19.5	11.0	55.3
18	94°00.0	-17°28.8	281°55.5	13.9	10°30.5	11.0	55.3
19	108°60.0	-17°29.4	296°28.4	13.9	10°41.5	10.9	55.3
20	123°59.9	-17°30.1	311°01.2	13.8	10°52.4	10.9	55.3
21	138°59.8	-17°30.8	325°34.0	13.7	11°03.3	10.9	55.3
22	153°59.8	-17°31.5	340°06.7	13.7	11°14.2	10.8	55.4
23	168°59.7	-17°32.2	354°39.3	13.6	11°25.0	10.8	55.4
	SD.=16.2	d=-0.7			S.D.=15.0		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:40	08:09	09:59	13:27	15:17	16:46
70	06:32	07:50	09:17	14:10	15:36	16:55
68	06:25	07:36	08:48	14:38	15:51	17:01
66	06:19	07:24	08:27	14:60	16:03	17:07
64	06:14	07:13	08:10	15:17	16:13	17:12
62	06:10	07:05	07:56	15:31	16:22	17:17
60	06:06	06:57	07:44	15:43	16:30	17:21
58	06:02	06:50	07:34	15:53	16:37	17:24
56	05:59	06:44	07:25	16:02	16:43	17:28
54	05:56	06:39	07:17	16:10	16:48	17:31
52	05:53	06:34	07:10	16:17	16:53	17:34
50	05:50	06:29	07:04	16:23	16:58	17:37
45	05:44	06:19	06:50	16:37	17:08	17:43
40	05:38	06:10	06:39	16:48	17:17	17:49
35	05:32	06:03	06:29	16:58	17:25	17:55
30	05:27	05:56	06:21	17:07	17:32	18:01
20	05:16	05:43	06:06	17:22	17:45	18:11
10	05:05	05:31	05:53	17:35	17:57	18:22
0	04:54	05:19	05:40	17:47	18:09	18:34
-10	04:40	05:06	05:28	17:60	18:22	18:48
-20	04:24	04:51	05:14	18:14	18:37	19:04
-30	04:02	04:33	04:59	18:29	18:55	19:26
-35	03:49	04:22	04:50	18:38	19:06	19:39
-40	03:33	04:10	04:39	18:49	19:19	19:56
-45	03:12	03:54	04:27	19:01	19:35	20:17
-50	02:45	03:34	04:12	19:16	19:55	20:44
-52	02:31	03:25	04:05	19:24	20:04	20:58
-54	02:15	03:14	03:57	19:32	20:15	21:15
-56	01:54	03:02	03:49	19:40	20:28	21:36
-58	01:27	02:47	03:39	19:51	20:43	22:05
-60	00:45	02:30	03:27	20:02	21:00	22:51

		Moonrise			**Moonset**	
Lat.	Sat	Sun	Mon	Sat	Sun	Mon
72	15:36	15:18	14:58	03:02	04:48	06:39
70	15:37	15:26	15:13	03:05	04:43	06:26
68	15:38	15:32	15:25	03:07	04:40	06:15
66	15:39	15:37	15:35	03:08	04:36	06:06
64	15:39	15:41	15:44	03:10	04:34	05:59
62	15:40	15:45	15:51	03:11	04:31	05:53
60	15:40	15:48	15:57	03:12	04:29	05:48
58	15:41	15:51	16:03	03:13	04:27	05:43
56	15:41	15:54	16:08	03:14	04:26	05:39
54	15:41	15:56	16:13	03:15	04:24	05:35
52	15:42	15:58	16:17	03:15	04:23	05:32
50	15:42	16:00	16:20	03:16	04:22	05:29
45	15:42	16:05	16:29	03:17	04:19	05:22
40	15:43	16:08	16:35	03:18	04:17	05:17
35	15:43	16:11	16:41	03:19	04:15	05:12
30	15:44	16:14	16:47	03:20	04:13	05:08
20	15:44	16:19	16:56	03:22	04:11	05:01
10	15:45	16:24	17:04	03:23	04:08	04:54
0	15:46	16:28	17:11	03:24	04:06	04:48
-10	15:46	16:32	17:19	03:25	04:03	04:42
-20	15:47	16:36	17:27	03:27	04:01	04:36
-30	15:48	16:41	17:36	03:28	03:58	04:29
-35	15:48	16:44	17:42	03:29	03:56	04:25
-40	15:49	16:48	17:48	03:29	03:54	04:20
-45	15:49	16:52	17:55	03:30	03:52	04:15
-50	15:50	16:56	18:04	03:32	03:50	04:09
-52	15:50	16:59	18:08	03:32	03:49	04:06
-54	15:51	17:01	18:13	03:33	03:47	04:03
-56	15:51	17:04	18:18	03:33	03:46	03:59
-58	15:52	17:07	18:23	03:34	03:44	03:55
-60	15:52	17:10	18:30	03:35	03:43	03:51

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	16:15	16:13	11:43	21:55	09:34	12(91%)
10	16:11	16:08	11:43	22:37	10:16	13(96%)
11	16:05	16:02	11:43	23:22	10:59	14(99%)

November 12, 13 ,14 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	50°50.1	159°47.6	-23°04.2	207°12.3	-9°02.3	145°41.3	-23°11.3	123°13.5	-22°19.9
1	65°52.5	174°46.8	-23°04.7	222°13.2	-9°02.9	160°43.2	-23°11.3	138°15.7	-22°19.9
2	80°55.0	189°45.9	-23°05.2	237°14.1	-9°03.5	175°45.1	-23°11.4	153°18.0	-22°19.9
3	95°57.5	204°45.0	-23°05.7	252°15.1	-9°04.2	190°47.0	-23°11.4	168°20.2	-22°19.9
4	110°59.9	219°44.2	-23°06.2	267°16.0	-9°04.8	205°48.9	-23°11.4	183°22.5	-22°19.8
5	126°02.4	234°43.3	-23°06.7	282°16.9	-9°05.4	220°50.8	-23°11.4	198°24.7	-22°19.8
6	141°04.9	249°42.4	-23°07.2	297°17.8	-9°06.0	235°52.7	-23°11.4	213°27.0	-22°19.8
7	156°07.3	264°41.6	-23°07.7	312°18.8	-9°06.6	250°54.6	-23°11.5	228°29.2	-22°19.8
8	171°09.8	279°40.7	-23°08.2	327°19.7	-9°07.2	265°56.5	-23°11.5	243°31.4	-22°19.7
9	186°12.3	294°39.8	-23°08.7	342°20.6	-9°07.8	280°58.4	-23°11.5	258°33.7	-22°19.7
10	201°14.7	309°39.0	-23°09.2	357°21.5	-9°08.4	296°00.3	-23°11.5	273°35.9	-22°19.7
11	216°17.2	324°38.1	-23°09.7	12°22.5	-9°09.0	311°02.2	-23°11.6	288°38.2	-22°19.7
12	231°19.7	339°37.2	-23°10.2	27°23.4	-9°09.7	326°04.1	-23°11.6	303°40.4	-22°19.7
13	246°22.1	354°36.4	-23°10.7	42°24.3	-9°10.3	341°06.0	-23°11.6	318°42.7	-22°19.6
14	261°24.6	9°35.5	-23°11.1	57°25.2	-9°10.9	356°08.0	-23°11.6	333°44.9	-22°19.6
15	276°27.0	24°34.6	-23°11.6	72°26.2	-9°11.5	11°09.9	-23°11.6	348°47.2	-22°19.6
16	291°29.5	39°33.7	-23°12.1	87°27.1	-9°12.1	26°11.8	-23°11.7	3°49.4	-22°19.6
17	306°32.0	54°32.9	-23°12.6	102°28.0	-9°12.7	41°13.7	-23°11.7	18°51.6	-22°19.6
18	321°34.4	69°32.0	-23°13.1	117°28.9	-9°13.3	56°15.6	-23°11.7	33°53.9	-22°19.5
19	336°36.9	84°31.1	-23°13.6	132°29.8	-9°13.9	71°17.5	-23°11.7	48°56.1	-22°19.5
20	351°39.4	99°30.2	-23°14.1	147°30.8	-9°14.5	86°19.4	-23°11.7	63°58.4	-22°19.5
21	6°41.8	114°29.4	-23°14.5	162°31.7	-9°15.1	101°21.3	-23°11.8	79°00.6	-22°19.5
22	21°44.3	129°28.5	-23°15.0	177°32.6	-9°15.8	116°23.2	-23°11.8	94°02.9	-22°19.4
23	36°46.8	144°27.6	-23°15.5	192°33.5	-9°16.4	131°25.1	-23°11.8	109°05.1	-22°19.4
	Mer.pass.:20:33	v-0.9 d-0.5 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	51°49.2	159°26.8	-23°16.0	207°34.5	-9°17.0	146°27.0	-23°11.8	124°07.3	-22°19.4
1	66°51.7	174°25.9	-23°16.4	222°35.4	-9°17.6	161°28.9	-23°11.9	139°09.6	-22°19.4
2	81°54.1	189°25.0	-23°16.9	237°36.3	-9°18.2	176°30.8	-23°11.9	154°11.8	-22°19.4
3	96°56.6	204°24.1	-23°17.4	252°37.2	-9°18.8	191°32.7	-23°11.9	169°14.1	-22°19.3
4	111°59.1	219°23.2	-23°17.9	267°38.2	-9°19.4	206°34.6	-23°11.9	184°16.3	-22°19.3
5	127°01.5	234°22.4	-23°18.3	282°39.1	-9°20.0	221°36.5	-23°11.9	199°18.6	-22°19.3
6	142°04.0	249°21.5	-23°18.8	297°40.0	-9°20.6	236°38.4	-23°12.0	214°20.8	-22°19.3
7	157°06.5	264°20.6	-23°19.3	312°40.9	-9°21.2	251°40.3	-23°12.0	229°23.0	-22°19.3
8	172°08.9	279°19.7	-23°19.7	327°41.8	-9°21.8	266°42.2	-23°12.0	244°25.3	-22°19.2
9	187°11.4	294°18.9	-23°20.2	342°42.8	-9°22.4	281°44.1	-23°12.0	259°27.5	-22°19.2
10	202°13.9	309°18.0	-23°20.7	357°43.7	-9°23.1	296°46.0	-23°12.0	274°29.8	-22°19.2
11	217°16.3	324°17.1	-23°21.1	12°44.6	-9°23.7	311°47.9	-23°12.1	289°32.0	-22°19.2
12	232°18.8	339°16.2	-23°21.6	27°45.5	-9°24.3	326°49.8	-23°12.1	304°34.3	-22°19.1
13	247°21.3	354°15.3	-23°22.1	42°46.5	-9°24.9	341°51.7	-23°12.1	319°36.5	-22°19.1
14	262°23.7	9°14.5	-23°22.5	57°47.4	-9°25.5	356°53.6	-23°12.1	334°38.7	-22°19.1
15	277°26.2	24°13.6	-23°23.0	72°48.3	-9°26.1	11°55.5	-23°12.1	349°41.0	-22°19.1
16	292°28.6	39°12.7	-23°23.4	87°49.2	-9°26.7	26°57.4	-23°12.2	4°43.2	-22°19.1
17	307°31.1	54°11.8	-23°23.9	102°50.1	-9°27.3	41°59.3	-23°12.2	19°45.5	-22°19.0
18	322°33.6	69°10.9	-23°24.3	117°51.1	-9°27.9	57°01.2	-23°12.2	34°47.7	-22°19.0
19	337°36.0	84°10.1	-23°24.8	132°52.0	-9°28.5	72°03.1	-23°12.2	49°49.9	-22°19.0
20	352°38.5	99°09.2	-23°25.2	147°52.9	-9°29.1	87°05.0	-23°12.2	64°52.2	-22°19.0
21	7°41.0	114°08.3	-23°25.7	162°53.8	-9°29.7	102°06.9	-23°12.3	79°54.4	-22°19.0
22	22°43.4	129°07.4	-23°26.2	177°54.7	-9°30.3	117°08.8	-23°12.3	94°56.7	-22°18.9
23	37°45.9	144°06.5	-23°26.6	192°55.7	-9°30.9	132°10.7	-23°12.3	109°58.9	-22°18.9
	Mer.pass.:20:29	v-0.9 d-0.5 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	52°48.4	159°05.6	-23°27.0	207°56.6	-9°31.6	147°12.6	-23°12.3	125°01.1	-22°18.9
1	67°50.8	174°04.8	-23°27.5	222°57.5	-9°32.2	162°14.5	-23°12.4	140°03.4	-22°18.9
2	82°53.3	189°03.9	-23°27.9	237°58.4	-9°32.8	177°16.4	-23°12.4	155°05.6	-22°18.8
3	97°55.8	204°03.0	-23°28.4	252°59.3	-9°33.4	192°18.3	-23°12.4	170°07.9	-22°18.8
4	112°58.2	219°02.1	-23°28.8	268°00.3	-9°34.0	207°20.2	-23°12.4	185°10.1	-22°18.8
5	128°00.7	234°01.2	-23°29.3	283°01.2	-9°34.6	222°22.1	-23°12.4	200°12.3	-22°18.8
6	143°03.1	249°00.3	-23°29.7	298°02.1	-9°35.2	237°24.0	-23°12.5	215°14.6	-22°18.8
7	158°05.6	263°59.4	-23°30.2	313°03.0	-9°35.8	252°25.9	-23°12.5	230°16.8	-22°18.7
8	173°08.1	278°58.5	-23°30.6	328°03.9	-9°36.4	267°27.8	-23°12.5	245°19.1	-22°18.7
9	188°10.5	293°57.7	-23°31.0	343°04.9	-9°37.0	282°29.7	-23°12.5	260°21.3	-22°18.7
10	203°13.0	308°56.8	-23°31.5	358°05.8	-9°37.6	297°31.6	-23°12.5	275°23.5	-22°18.7
11	218°15.5	323°55.9	-23°31.9	13°06.7	-9°38.2	312°33.5	-23°12.6	290°25.8	-22°18.6
12	233°17.9	338°55.0	-23°32.3	28°07.6	-9°38.8	327°35.4	-23°12.6	305°28.0	-22°18.6
13	248°20.4	353°54.1	-23°32.8	43°08.5	-9°39.4	342°37.3	-23°12.6	320°30.3	-22°18.6
14	263°22.9	8°53.2	-23°33.2	58°09.5	-9°40.0	357°39.2	-23°12.6	335°32.5	-22°18.6
15	278°25.3	23°52.3	-23°33.6	73°10.4	-9°40.6	12°41.1	-23°12.6	350°34.7	-22°18.6
16	293°27.8	38°51.4	-23°34.1	88°11.3	-9°41.2	27°43.0	-23°12.7	5°37.0	-22°18.5
17	308°30.3	53°50.5	-23°34.5	103°12.2	-9°41.9	42°44.9	-23°12.7	20°39.2	-22°18.5
18	323°32.7	68°49.7	-23°34.9	118°13.1	-9°42.5	57°46.8	-23°12.7	35°41.4	-22°18.5
19	338°35.2	83°48.8	-23°35.3	133°14.0	-9°43.1	72°48.7	-23°12.7	50°43.7	-22°18.5
20	353°37.6	98°47.9	-23°35.8	148°15.0	-9°43.7	87°50.6	-23°12.7	65°45.9	-22°18.4
21	8°40.1	113°47.0	-23°36.2	163°15.9	-9°44.3	102°52.5	-23°12.8	80°48.2	-22°18.4
22	23°42.6	128°46.1	-23°36.6	178°16.8	-9°44.9	117°54.4	-23°12.8	95°50.4	-22°18.4
23	38°45.0	143°45.2	-23°37.0	193°17.7	-9°45.5	132°56.3	-23°12.8	110°52.6	-22°18.4
	Mer.pass.:20:25	v-0.9 d-0.4 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.0	-42°12.1
Schedar	349°35.1	56°38.9
Diphda	348°51.1	-17°52.8
Achernar	335°23.0	-57°08.4
Hamal	327°55.5	23°33.4
Polaris	315°24.0	89°20.8
Akamar	315°14.6	-40°13.6
Menkar	314°10.2	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.0	16°32.9
Rigel	281°07.6	-8°10.8
Capella	280°27.6	46°00.9
Bellatrix	278°27.0	6°22.0
Elnath	278°06.8	28°37.3
Alnilam	275°41.7	-1°11.4
Betelgeuse	270°56.3	7°24.6
Canopus	263°53.8	-52°42.2
Sirius	258°29.6	-16°44.4
Adara	255°08.9	-28°59.8
Procyon	244°54.9	5°10.6
Pollux	243°22.1	27°58.6
Avior	234°16.1	-59°34.1
Suhail	222°49.2	-43°30.5
Miaplacidus	221°38.8	-69°47.5
Alphard	217°51.8	-8°44.5
Regulus	207°38.9	11°52.3
Dubhe	193°46.6	61°38.5
Denebola	182°29.3	14°27.8
Gienah	175°48.0	-17°38.8
Acrux	173°05.0	-63°12.2
Gacrux	171°56.5	-57°13.1
Alioth	166°17.3	55°51.1
Spica	158°26.9	-11°15.6
Alcaid	152°55.9	49°12.9
Hadar	148°42.3	-60°27.8
Menkent	148°02.8	-36°27.7
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.5	-60°54.7
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.5
Alphecca	126°07.7	26°39.1
Antares	112°21.3	-26°28.3
Atria	107°19.7	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.4	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.5	51°29.5
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.2	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.5	-56°40.4
Deneb	49°28.6	45°21.4
Enif	33°42.8	9°58.1
Alnair	27°38.2	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/11/	SHA	Mer.pass
Venus	108°57.6	13:22
Mars	156°22.2	10:11
Jupiter	94°51.2	14:15
Saturn	72°23.4	15:45

2019/11/	SHA	Mer.pass
Venus	107°37.5	13:23
Mars	155°45.2	10:09
Jupiter	94°37.8	14:12
Saturn	72°18.1	15:41

2019/11/	SHA	Mer.pass
Venus	106°17.3	13:24
Mars	155°08.2	10:08
Jupiter	94°24.3	14:09
Saturn	72°12.8	15:38

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°59.6	-17°32.9	9°11.9	13.6	11°35.7	10.7	55.4
1	198°59.5	-17°33.6	23°44.5	13.5	11°46.4	10.7	55.4
2	213°59.5	-17°34.2	38°16.9	13.4	11°57.1	10.7	55.4
3	228°59.4	-17°34.9	52°49.4	13.4	12°07.7	10.6	55.5
4	243°59.3	-17°35.6	67°21.7	13.3	12°18.3	10.6	55.5
5	258°59.3	-17°36.3	81°54.0	13.3	12°28.9	10.5	55.5
6	273°59.2	-17°37.0	96°26.3	13.2	12°39.3	10.5	55.5
7	288°59.1	-17°37.6	110°58.4	13.1	12°49.8	10.4	55.5
8	303°59.0	-17°38.3	125°30.5	13.1	13°00.2	10.4	55.5
9	318°59.0	-17°39.0	140°02.6	13.0	13°10.5	10.3	55.6
10	333°58.9	-17°39.7	154°34.6	12.9	13°20.8	10.3	55.6
11	348°58.8	-17°40.4	169°06.5	12.9	13°31.0	10.2	55.6
12	3°58.7	-17°41.0	183°38.3	12.8	13°41.2	10.1	55.6
13	18°58.7	-17°41.7	198°10.1	12.8	13°51.3	10.1	55.6
14	33°58.6	-17°42.4	212°41.8	12.7	14°01.4	10.0	55.7
15	48°58.5	-17°43.1	227°13.5	12.6	14°11.4	10.0	55.7
16	63°58.4	-17°43.7	241°45.1	12.6	14°21.3	9.9	55.7
17	78°58.3	-17°44.4	256°16.6	12.5	14°31.2	9.9	55.7
18	93°58.3	-17°45.1	270°48.0	12.4	14°41.1	9.8	55.7
19	108°58.2	-17°45.8	285°19.4	12.3	14°50.8	9.7	55.8
20	123°58.1	-17°46.4	299°50.7	12.3	15°00.5	9.7	55.8
21	138°58.0	-17°47.1	314°22.0	12.2	15°10.2	9.6	55.8
22	153°57.9	-17°47.8	328°53.2	12.1	15°19.7	9.5	55.8
23	168°57.9	-17°48.5	343°24.3	12.1	15°29.3	9.5	55.8
	SD.=16.2	d=-0.7			S.D.=15.1		

Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°57.8	-17°49.1	357°55.3	12.0	15°38.7	9.4	55.9
1	198°57.7	-17°49.8	12°26.3	11.9	15°48.1	9.3	55.9
2	213°57.6	-17°50.5	26°57.2	11.9	15°57.4	9.3	55.9
3	228°57.5	-17°51.1	41°28.0	11.8	16°06.6	9.2	55.9
4	243°57.5	-17°51.8	55°58.7	11.7	16°15.8	9.1	55.9
5	258°57.4	-17°52.5	70°29.4	11.6	16°24.9	9.1	56.0
6	273°57.3	-17°53.1	85°00.0	11.6	16°33.9	9.0	56.0
7	288°57.2	-17°53.8	99°30.6	11.5	16°42.9	8.9	56.0
8	303°57.1	-17°54.5	114°01.1	11.4	16°51.7	8.8	56.0
9	318°57.0	-17°55.1	128°31.4	11.4	17°00.5	8.8	56.0
10	333°57.0	-17°55.8	143°01.8	11.3	17°09.2	8.7	56.1
11	348°56.9	-17°56.5	157°32.0	11.2	17°17.9	8.6	56.1
12	3°56.8	-17°57.1	172°02.2	11.1	17°26.4	8.5	56.1
13	18°56.7	-17°57.8	186°32.3	11.1	17°34.9	8.4	56.1
14	33°56.6	-17°58.5	201°02.3	11.0	17°43.3	8.4	56.1
15	48°56.5	-17°59.1	215°32.3	10.9	17°51.6	8.3	56.2
16	63°56.4	-17°59.8	230°02.2	10.9	17°59.9	8.2	56.2
17	78°56.4	-18°00.4	244°32.0	10.8	18°08.0	8.1	56.2
18	93°56.3	-18°01.1	259°01.8	10.7	18°16.1	8.0	56.2
19	108°56.2	-18°01.8	273°31.4	10.6	18°24.0	7.9	56.2
20	123°56.1	-18°02.4	288°01.0	10.6	18°31.9	7.8	56.3
21	138°56.0	-18°03.1	302°30.5	10.5	18°39.7	7.8	56.3
22	153°55.9	-18°03.7	316°60.0	10.4	18°47.4	7.7	56.3
23	168°55.8	-18°04.4	331°29.4	10.3	18°55.0	7.6	56.3
	SD.=16.2	d=-0.7			S.D.=15.2		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°55.7	-18°05.1	345°58.7	10.3	19°02.6	7.5	56.3
1	198°55.6	-18°05.7	0°27.9	10.2	19°10.0	7.4	56.4
2	213°55.6	-18°06.4	14°57.1	10.1	19°17.3	7.3	56.4
3	228°55.5	-18°07.0	29°26.2	10.1	19°24.6	7.2	56.4
4	243°55.4	-18°07.7	43°55.2	10.0	19°31.7	7.1	56.4
5	258°55.3	-18°08.3	58°24.1	9.9	19°38.7	7.0	56.4
6	273°55.2	-18°09.0	72°53.0	9.8	19°45.7	6.9	56.5
7	288°55.1	-18°09.7	87°21.8	9.8	19°52.5	6.8	56.5
8	303°55.0	-18°10.3	101°50.6	9.7	19°59.3	6.7	56.5
9	318°54.9	-18°11.0	116°19.2	9.6	20°05.9	6.6	56.5
10	333°54.8	-18°11.6	130°47.8	9.6	20°12.5	6.5	56.6
11	348°54.7	-18°12.3	145°16.4	9.5	20°18.9	6.4	56.6
12	3°54.6	-18°12.9	159°44.8	9.4	20°25.2	6.3	56.6
13	18°54.5	-18°13.6	174°13.2	9.4	20°31.5	6.2	56.6
14	33°54.4	-18°14.2	188°41.5	9.3	20°37.6	6.1	56.6
15	48°54.3	-18°14.9	203°09.8	9.2	20°43.6	6.0	56.7
16	63°54.2	-18°15.5	217°38.0	9.2	20°49.5	5.8	56.7
17	78°54.2	-18°16.2	232°06.1	9.1	20°55.3	5.7	56.7
18	93°54.1	-18°16.8	246°34.1	9.0	21°01.0	5.6	56.7
19	108°54.0	-18°17.5	261°02.1	9.0	21°06.5	5.5	56.7
20	123°53.9	-18°18.1	275°30.0	8.9	21°12.0	5.4	56.8
21	138°53.8	-18°18.8	289°57.9	8.8	21°17.3	5.3	56.8
22	153°53.7	-18°19.4	304°25.7	8.8	21°22.6	5.2	56.8
23	168°53.6	-18°20.1	318°53.4	8.7	21°27.7	5.1	56.8
	SD.=16.2	d=-0.7			S.D.=15.4		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	06:51	08:23	10:29	12:58	15:04	16:36
70	06:42	08:02	09:34	13:53	15:25	16:45
68	06:34	07:46	09:02	14:26	15:41	16:53
66	06:28	07:33	08:38	14:49	15:55	16:60
64	06:22	07:21	08:20	15:08	16:06	17:06
62	06:17	07:12	08:05	15:23	16:16	17:11
60	06:12	07:04	07:52	15:36	16:24	17:15
58	06:08	06:56	07:41	15:47	16:31	17:19
56	06:04	06:50	07:32	15:56	16:38	17:23
54	06:01	06:44	07:23	16:05	16:44	17:27
52	05:58	06:39	07:16	16:12	16:49	17:30
50	05:54	06:34	07:09	16:19	16:54	17:33
45	05:47	06:23	06:54	16:34	17:05	17:41
40	05:41	06:13	06:42	16:46	17:15	17:47
35	05:35	06:05	06:32	16:56	17:23	17:53
30	05:29	05:58	06:23	17:05	17:30	17:59
20	05:18	05:44	06:07	17:21	17:44	18:10
10	05:06	05:32	05:54	17:35	17:57	18:22
0	04:54	05:19	05:41	17:48	18:09	18:35
-10	04:39	05:05	05:28	18:01	18:23	18:49
-20	04:22	04:50	05:13	18:15	18:39	19:06
-30	04:00	04:31	04:57	18:32	18:58	19:29
-35	03:46	04:20	04:48	18:41	19:09	19:43
-40	03:29	04:06	04:37	18:52	19:23	20:00
-45	03:08	03:50	04:24	19:06	19:39	20:22
-50	02:39	03:29	04:08	19:22	20:00	20:51
-52	02:24	03:19	04:00	19:29	20:10	21:07
-54	02:06	03:08	03:52	19:37	20:22	21:25
-56	01:43	02:55	03:43	19:47	20:36	21:48
-58	01:12	02:39	03:32	19:58	20:51	22:21
-60	00:10	02:20	03:20	20:10	21:11	–:–

Lat.	**Moonrise**			**Moonset**		
	Tue	Wed	Thu	Tue	Wed	Thu
72	14:30	13:29	–:–	08:41	11:22	–:–
70	14:57	14:32	–:–	08:15	10:19	–:–
68	15:18	15:08	14:53	07:56	09:44	11:45
66	15:34	15:34	15:37	07:40	09:19	11:02
64	15:48	15:54	16:06	07:28	08:60	10:33
62	15:59	16:11	16:29	07:18	08:44	10:11
60	16:09	16:24	16:47	07:09	08:31	09:54
58	16:17	16:36	17:02	07:01	08:20	09:39
56	16:25	16:46	17:15	06:54	08:10	09:26
54	16:32	16:56	17:26	06:48	08:02	09:15
52	16:38	17:04	17:36	06:42	07:54	09:06
50	16:43	17:11	17:45	06:37	07:47	08:57
45	16:55	17:27	18:04	06:27	07:33	08:39
40	17:05	17:40	18:20	06:18	07:21	08:24
35	17:14	17:51	18:33	06:10	07:10	08:11
30	17:22	18:01	18:44	06:04	07:01	08:01
20	17:35	18:17	19:04	05:52	06:46	07:42
10	17:46	18:32	19:22	05:42	06:33	07:26
0	17:57	18:46	19:38	05:33	06:20	07:10
-10	18:08	18:60	19:54	05:24	06:08	06:55
-20	18:20	19:15	20:11	05:14	05:54	06:39
-30	18:33	19:32	20:32	05:03	05:39	06:21
-35	18:41	19:42	20:43	04:56	05:31	06:10
-40	18:50	19:54	20:57	04:49	05:21	05:58
-45	19:01	20:07	21:13	04:40	05:09	05:43
-50	19:14	20:24	21:33	04:30	04:55	05:25
-52	19:20	20:32	21:43	04:25	04:48	05:17
-54	19:26	20:41	21:53	04:20	04:41	05:08
-56	19:34	20:51	22:06	04:14	04:33	04:57
-58	19:42	21:02	22:20	04:08	04:24	04:46
-60	19:52	21:15	22:36	04:01	04:14	04:32

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	15:59	15:55	11:44	00:08	11:44	15(100%)
13	15:51	15:47	11:44	00:08	12:32	16(99%)
14	15:43	15:39	11:44	00:58	13:23	17(96%)

November 15, 16 ,17 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	53°47.5	158°44.3	-23°37.4	208°18.6	-9°46.1	147°58.2	-23°12.8	125°54.9	-22°18.4
1	68°50.0	173°43.4	-23°37.9	223°19.5	-9°46.7	163°00.1	-23°12.8	140°57.1	-22°18.3
2	83°52.4	188°42.5	-23°38.3	238°20.5	-9°47.3	178°02.0	-23°12.8	155°59.3	-22°18.3
3	98°54.9	203°41.6	-23°38.7	253°21.4	-9°47.9	193°03.9	-23°12.9	171°01.6	-22°18.3
4	113°57.4	218°40.7	-23°39.1	268°22.3	-9°48.5	208°05.8	-23°12.9	186°03.8	-22°18.3
5	128°59.8	233°39.8	-23°39.5	283°23.2	-9°49.1	223°07.7	-23°12.9	201°06.1	-22°18.2
6	144°02.3	248°38.9	-23°39.9	298°24.1	-9°49.7	238°09.6	-23°12.9	216°08.3	-22°18.2
7	159°04.7	263°38.1	-23°40.3	313°25.0	-9°50.3	253°11.5	-23°12.9	231°10.5	-22°18.2
8	174°07.2	278°37.2	-23°40.8	328°26.0	-9°50.9	268°13.4	-23°13.0	246°12.8	-22°18.2
9	189°09.7	293°36.3	-23°41.2	343°26.9	-9°51.5	283°15.3	-23°13.0	261°15.0	-22°18.2
10	204°12.1	308°35.4	-23°41.6	358°27.8	-9°52.1	298°17.2	-23°13.0	276°17.2	-22°18.1
11	219°14.6	323°34.5	-23°42.0	13°28.7	-9°52.7	313°19.1	-23°13.0	291°19.5	-22°18.1
12	234°17.1	338°33.6	-23°42.4	28°29.6	-9°53.3	328°21.0	-23°13.0	306°21.7	-22°18.1
13	249°19.5	353°32.7	-23°42.8	43°30.5	-9°53.9	343°22.9	-23°13.1	321°23.9	-22°18.1
14	264°22.0	8°31.8	-23°43.2	58°31.5	-9°54.5	358°24.8	-23°13.1	336°26.2	-22°18.0
15	279°24.5	23°30.9	-23°43.6	73°32.4	-9°55.1	13°26.7	-23°13.1	351°28.4	-22°18.0
16	294°26.9	38°30.0	-23°44.0	88°33.3	-9°55.7	28°28.6	-23°13.1	6°30.6	-22°18.0
17	309°29.4	53°29.1	-23°44.4	103°34.2	-9°56.3	43°30.5	-23°13.1	21°32.9	-22°18.0
18	324°31.9	68°28.2	-23°44.8	118°35.1	-9°56.9	58°32.4	-23°13.2	36°35.1	-22°17.9
19	339°34.3	83°27.3	-23°45.2	133°36.0	-9°57.5	73°34.3	-23°13.2	51°37.4	-22°17.9
20	354°36.8	98°26.4	-23°45.6	148°36.9	-9°58.1	88°36.2	-23°13.2	66°39.6	-22°17.9
21	9°39.2	113°25.5	-23°46.0	163°37.9	-9°58.7	103°38.1	-23°13.2	81°41.8	-22°17.9
22	24°41.7	128°24.6	-23°46.4	178°38.8	-9°59.3	118°39.9	-23°13.2	96°44.1	-22°17.9
23	39°44.2	143°23.7	-23°46.8	193°39.7	-9°59.9	133°41.8	-23°13.3	111°46.3	-22°17.8
Mer.pass.:20:21		v-0.9 d-0.4 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	54°46.6	158°22.8	-23°47.1	208°40.6	-10°00.6	148°43.7	-23°13.3	126°48.5	-22°17.8
1	69°49.1	173°21.9	-23°47.5	223°41.5	-10°01.2	163°45.6	-23°13.3	141°50.8	-22°17.8
2	84°51.6	188°21.0	-23°47.9	238°42.4	-10°01.8	178°47.5	-23°13.3	156°53.0	-22°17.8
3	99°54.0	203°20.1	-23°48.3	253°43.3	-10°02.4	193°49.4	-23°13.3	171°55.2	-22°17.7
4	114°56.5	218°19.2	-23°48.7	268°44.2	-10°03.0	208°51.3	-23°13.3	186°57.5	-22°17.7
5	129°59.0	233°18.3	-23°49.1	283°45.2	-10°03.6	223°53.2	-23°13.4	201°59.7	-22°17.7
6	145°01.4	248°17.4	-23°49.5	298°46.1	-10°04.2	238°55.1	-23°13.4	217°01.9	-22°17.7
7	160°03.9	263°16.5	-23°49.8	313°47.0	-10°04.8	253°57.0	-23°13.4	232°04.2	-22°17.7
8	175°06.4	278°15.6	-23°50.2	328°47.9	-10°05.4	268°58.9	-23°13.4	247°06.4	-22°17.6
9	190°08.8	293°14.7	-23°50.6	343°48.8	-10°06.0	284°00.8	-23°13.4	262°08.6	-22°17.6
10	205°11.3	308°13.8	-23°51.0	358°49.7	-10°06.6	299°02.7	-23°13.5	277°10.9	-22°17.6
11	220°13.7	323°12.9	-23°51.4	13°50.6	-10°07.2	314°04.6	-23°13.5	292°13.1	-22°17.6
12	235°16.2	338°12.0	-23°51.7	28°51.5	-10°07.8	329°06.5	-23°13.5	307°15.3	-22°17.5
13	250°18.7	353°11.0	-23°52.1	43°52.5	-10°08.4	344°08.4	-23°13.5	322°17.6	-22°17.5
14	265°21.1	8°10.1	-23°52.5	58°53.4	-10°09.0	359°10.3	-23°13.5	337°19.8	-22°17.5
15	280°23.6	23°09.2	-23°52.8	73°54.3	-10°09.6	14°12.2	-23°13.6	352°22.0	-22°17.5
16	295°26.1	38°08.3	-23°53.2	88°55.2	-10°10.2	29°14.0	-23°13.6	7°24.3	-22°17.4
17	310°28.5	53°07.4	-23°53.6	103°56.1	-10°10.8	44°15.9	-23°13.6	22°26.5	-22°17.4
18	325°31.0	68°06.5	-23°54.0	118°57.0	-10°11.4	59°17.8	-23°13.6	37°28.7	-22°17.4
19	340°33.5	83°05.6	-23°54.3	133°57.9	-10°12.0	74°19.7	-23°13.6	52°31.0	-22°17.4
20	355°35.9	98°04.7	-23°54.7	148°58.8	-10°12.6	89°21.6	-23°13.6	67°33.2	-22°17.3
21	10°38.4	113°03.8	-23°55.1	163°59.8	-10°13.2	104°23.5	-23°13.7	82°35.4	-22°17.3
22	25°40.9	128°02.9	-23°55.4	179°00.7	-10°13.8	119°25.4	-23°13.7	97°37.6	-22°17.3
23	40°43.3	143°02.0	-23°55.8	194°01.6	-10°14.4	134°27.3	-23°13.7	112°39.9	-22°17.3
Mer.pass.:20:17		v-0.9 d-0.4 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	55°45.8	158°01.1	-23°56.1	209°02.5	-10°15.0	149°29.2	-23°13.7	127°42.1	-22°17.3
1	70°48.2	173°00.2	-23°56.5	224°03.4	-10°15.6	164°31.1	-23°13.7	142°44.3	-22°17.2
2	85°50.7	187°59.3	-23°56.9	239°04.3	-10°16.2	179°33.0	-23°13.8	157°46.6	-22°17.2
3	100°53.2	202°58.4	-23°57.2	254°05.2	-10°16.7	194°34.9	-23°13.8	172°48.8	-22°17.2
4	115°55.6	217°57.4	-23°57.6	269°06.1	-10°17.3	209°36.8	-23°13.8	187°51.0	-22°17.2
5	130°58.1	232°56.5	-23°57.9	284°07.0	-10°17.9	224°38.6	-23°13.8	202°53.3	-22°17.1
6	146°00.6	247°55.6	-23°58.3	299°07.9	-10°18.5	239°40.5	-23°13.8	217°55.5	-22°17.1
7	161°03.0	262°54.7	-23°58.6	314°08.9	-10°19.1	254°42.4	-23°13.8	232°57.7	-22°17.1
8	176°05.5	277°53.8	-23°59.0	329°09.8	-10°19.7	269°44.3	-23°13.9	247°60.0	-22°17.1
9	191°08.0	292°52.9	-23°59.3	344°10.7	-10°20.3	284°46.2	-23°13.9	263°02.2	-22°17.0
10	206°10.4	307°52.0	-23°59.7	359°11.6	-10°20.9	299°48.1	-23°13.9	278°04.4	-22°17.0
11	221°12.9	322°51.1	-24°00.0	14°12.5	-10°21.5	314°50.0	-23°13.9	293°06.6	-22°17.0
12	236°15.4	337°50.2	-24°00.4	29°13.4	-10°22.1	329°51.9	-23°13.9	308°08.9	-22°17.0
13	251°17.8	352°49.2	-24°00.7	44°14.3	-10°22.7	344°53.8	-23°14.0	323°11.1	-22°17.0
14	266°20.3	7°48.3	-24°01.1	59°15.2	-10°23.3	359°55.7	-23°14.0	338°13.3	-22°16.9
15	281°22.7	22°47.4	-24°01.4	74°16.1	-10°23.9	14°57.6	-23°14.0	353°15.6	-22°16.9
16	296°25.2	37°46.5	-24°01.7	89°17.0	-10°24.5	29°59.4	-23°14.0	8°17.8	-22°16.9
17	311°27.7	52°45.6	-24°02.1	104°17.9	-10°25.1	45°01.3	-23°14.0	23°20.0	-22°16.9
18	326°30.1	67°44.7	-24°02.4	119°18.9	-10°25.7	60°03.2	-23°14.0	38°22.3	-22°16.8
19	341°32.6	82°43.8	-24°02.8	134°19.8	-10°26.3	75°05.1	-23°14.1	53°24.5	-22°16.8
20	356°35.1	97°42.9	-24°03.1	149°20.7	-10°26.9	90°07.0	-23°14.1	68°26.7	-22°16.8
21	11°37.5	112°41.9	-24°03.4	164°21.6	-10°27.5	105°08.9	-23°14.1	83°28.9	-22°16.8
22	26°40.0	127°41.0	-24°03.8	179°22.5	-10°28.1	120°10.8	-23°14.1	98°31.2	-22°16.7
23	41°42.5	142°40.1	-24°04.1	194°23.4	-10°28.7	135°12.7	-23°14.1	113°33.4	-22°16.7
Mer.pass.:20:13		v-0.9 d-0.4 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.1
Schedar	349°35.1	56°38.9
Diphda	348°51.1	-17°52.8
Achernar	335°23.0	-57°08.4
Hamal	327°55.5	23°33.4
Polaris	315°23.8	89°20.8
Akamar	315°14.6	-40°13.6
Menkar	314°10.1	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.6	46°00.9
Bellatrix	278°27.0	6°22.0
Elnath	278°06.8	28°37.3
Alnilam	275°41.6	-1°11.4
Betelgeuse	270°56.3	7°24.6
Canopus	263°53.8	-52°42.2
Sirius	258°29.5	-16°44.4
Adara	255°08.8	-28°59.8
Procyon	244°54.9	5°10.6
Pollux	243°22.1	27°58.6
Avior	234°16.1	-59°34.1
Suhail	222°49.2	-43°30.5
Miaplacidus	221°38.7	-69°47.5
Alphard	217°51.8	-8°44.5
Regulus	207°38.9	11°52.3
Dubhe	193°46.5	61°38.5
Denebola	182°29.3	14°27.8
Gienah	175°48.0	-17°38.9
Acrux	173°04.9	-63°12.2
Gacrux	171°56.5	-57°13.1
Alioth	166°17.3	55°51.1
Spica	158°26.9	-11°15.6
Alcaid	152°55.8	49°12.9
Hadar	148°42.3	-60°27.8
Menkent	148°02.8	-36°27.7
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.5	-60°54.7
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.5
Alphecca	126°07.7	26°39.1
Antares	112°21.2	-26°28.3
Atria	107°19.7	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.4	-37°07.0
Rasalhague	96°02.7	12°33.0
Etamin	90°44.5	51°29.5
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.3	38°48.4
Nunki	75°53.2	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.5	-56°40.4
Deneb	49°28.7	45°21.4
Enif	33°42.9	9°58.1
Alnair	27°38.2	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/11/	SHA	Mer.pass
Venus	104°56.8	13:26
Mars	154°31.1	10:06
Jupiter	94°10.7	14:06
Saturn	72°07.4	15:34

2019/11/	SHA	Mer.pass
Venus	103°36.1	13:27
Mars	153°54.0	10:05
Jupiter	93°57.1	14:03
Saturn	72°01.9	15:30

2019/11/	SHA	Mer.pass
Venus	102°15.3	13:29
Mars	153°16.7	10:03
Jupiter	93°43.4	14:00
Saturn	71°56.3	15:27

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°53.5	-18°20.7	333°21.1	8.6	21°32.7	4.9	56.8
1	198°53.4	-18°21.3	347°48.7	8.6	21°37.6	4.8	56.9
2	213°53.3	-18°22.0	2°16.2	8.5	21°42.3	4.7	56.9
3	228°53.2	-18°22.6	16°43.7	8.5	21°47.0	4.6	56.9
4	243°53.1	-18°23.3	31°11.1	8.4	21°51.5	4.5	56.9
5	258°53.0	-18°23.9	45°38.5	8.3	21°55.9	4.3	56.9
6	273°52.9	-18°24.6	60°05.8	8.3	22°00.2	4.2	57.0
7	288°52.8	-18°25.2	74°33.1	8.2	22°04.4	4.1	57.0
8	303°52.7	-18°25.8	89°00.3	8.2	22°08.4	4.0	57.0
9	318°52.6	-18°26.5	103°27.4	8.1	22°12.3	3.9	57.0
10	333°52.5	-18°27.1	117°54.5	8.1	22°16.1	3.7	57.0
11	348°52.4	-18°27.8	132°21.5	8.0	22°19.8	3.6	57.1
12	3°52.3	-18°28.4	146°48.5	8.0	22°23.3	3.5	57.1
13	18°52.2	-18°29.0	161°15.4	7.9	22°26.7	3.3	57.1
14	33°52.1	-18°29.7	175°42.3	7.8	22°30.0	3.2	57.1
15	48°51.9	-18°30.3	190°09.1	7.8	22°33.2	3.1	57.1
16	63°51.8	-18°30.9	204°35.9	7.8	22°36.2	3.0	57.2
17	78°51.7	-18°31.6	219°02.6	7.7	22°39.1	2.8	57.2
18	93°51.6	-18°32.2	233°29.3	7.7	22°41.9	2.7	57.2
19	108°51.5	-18°32.8	247°55.9	7.6	22°44.5	2.6	57.2
20	123°51.4	-18°33.5	262°22.5	7.6	22°47.0	2.4	57.2
21	138°51.3	-18°34.1	276°49.1	7.5	22°49.4	2.3	57.3
22	153°51.2	-18°34.7	291°15.6	7.5	22°51.6	2.2	57.3
23	168°51.1	-18°35.4	305°42.0	7.4	22°53.7	2.0	57.3
	SD.=16.2	d=-0.6			S.D.=15.5		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°51.0	-18°36.0	320°08.5	7.4	22°55.7	1.9	57.3
1	198°50.9	-18°36.6	334°34.9	7.4	22°57.5	1.8	57.3
2	213°50.8	-18°37.3	349°01.2	7.3	22°59.2	1.6	57.4
3	228°50.7	-18°37.9	3°27.5	7.3	23°00.8	1.5	57.4
4	243°50.6	-18°38.5	17°53.8	7.3	23°02.2	1.4	57.4
5	258°50.4	-18°39.2	32°20.0	7.2	23°03.5	1.2	57.4
6	273°50.3	-18°39.8	46°46.2	7.2	23°04.7	1.1	57.4
7	288°50.2	-18°40.4	61°12.4	7.2	23°05.7	1.0	57.5
8	303°50.1	-18°41.0	75°38.6	7.1	23°06.6	0.8	57.5
9	318°50.0	-18°41.7	90°04.7	7.1	23°07.4	0.7	57.5
10	333°49.9	-18°42.3	104°30.8	7.1	23°08.0	0.5	57.5
11	348°49.8	-18°42.9	118°56.8	7.0	23°08.5	0.4	57.5
12	3°49.7	-18°43.5	133°22.9	7.0	23°08.8	0.3	57.6
13	18°49.6	-18°44.2	147°48.9	7.0	23°09.0	0.1	57.6
14	33°49.4	-18°44.8	162°14.9	7.0	23°09.0	-0.0	57.6
15	48°49.3	-18°45.4	176°40.8	7.0	23°09.0	-0.2	57.6
16	63°49.2	-18°46.0	191°06.8	6.9	23°08.7	-0.3	57.6
17	78°49.1	-18°46.7	205°32.7	6.9	23°08.4	-0.4	57.6
18	93°49.0	-18°47.3	219°58.6	6.9	23°07.9	-0.6	57.7
19	108°48.9	-18°47.9	234°24.5	6.9	23°07.2	-0.7	57.7
20	123°48.8	-18°48.5	248°50.4	6.9	23°06.4	-0.9	57.7
21	138°48.6	-18°49.1	263°16.3	6.9	23°05.5	-1.0	57.7
22	153°48.5	-18°49.8	277°42.1	6.8	23°04.4	-1.1	57.7
23	168°48.4	-18°50.4	292°08.0	6.8	23°03.2	-1.3	57.8
	SD.=16.2	d=-0.6			S.D.=15.6		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°48.3	-18°51.0	306°33.8	6.8	23°01.9	-1.4	57.8
1	198°48.2	-18°51.6	320°59.6	6.8	23°00.4	-1.6	57.8
2	213°48.1	-18°52.2	335°25.4	6.8	22°58.7	-1.7	57.8
3	228°48.0	-18°52.8	349°51.2	6.8	22°57.0	-1.8	57.8
4	243°47.8	-18°53.5	4°17.1	6.8	22°55.1	-2.0	57.9
5	258°47.7	-18°54.1	18°42.9	6.8	22°53.0	-2.1	57.9
6	273°47.6	-18°54.7	33°08.7	6.8	22°50.8	-2.3	57.9
7	288°47.5	-18°55.3	47°34.4	6.8	22°48.5	-2.4	57.9
8	303°47.4	-18°55.9	62°00.2	6.8	22°46.0	-2.6	57.9
9	318°47.2	-18°56.5	76°26.0	6.8	22°43.4	-2.7	58.0
10	333°47.1	-18°57.1	90°51.8	6.8	22°40.6	-2.8	58.0
11	348°47.0	-18°57.7	105°17.7	6.8	22°37.7	-3.0	58.0
12	3°46.9	-18°58.4	119°43.5	6.8	22°34.7	-3.1	58.0
13	18°46.8	-18°59.0	134°09.3	6.8	22°31.5	-3.3	58.0
14	33°46.6	-18°59.6	148°35.1	6.8	22°28.1	-3.4	58.1
15	48°46.5	-19°00.2	163°00.9	6.8	22°24.7	-3.5	58.1
16	63°46.4	-19°00.8	177°26.8	6.8	22°21.1	-3.7	58.1
17	78°46.3	-19°01.4	191°52.6	6.9	22°17.3	-3.8	58.1
18	93°46.1	-19°02.0	206°18.5	6.9	22°13.5	-3.9	58.1
19	108°46.0	-19°02.6	220°44.4	6.9	22°09.4	-4.1	58.1
20	123°45.9	-19°03.2	235°10.3	6.9	22°05.3	-4.2	58.2
21	138°45.8	-19°03.8	249°36.2	6.9	22°01.0	-4.4	58.2
22	153°45.6	-19°04.4	264°02.1	6.9	21°56.6	-4.5	58.2
23	168°45.5	-19°05.0	278°28.1	7.0	21°52.0	-4.6	58.2
	SD.=16.2	d=-0.6			S.D.=15.8		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:02	08:37	11:18	12:11	14:51	16:26
70	06:51	08:14	09:54	13:35	15:14	16:37
68	06:43	07:56	09:16	14:13	15:32	16:46
66	06:35	07:42	08:50	14:39	15:47	16:53
64	06:29	07:29	08:29	14:59	15:59	16:59
62	06:23	07:19	08:13	15:15	16:09	17:05
60	06:18	07:10	07:60	15:29	16:18	17:10
58	06:14	07:02	07:48	15:41	16:26	17:15
56	06:10	06:55	07:38	15:51	16:33	17:19
54	06:06	06:49	07:29	15:60	16:40	17:23
52	06:02	06:43	07:21	16:08	16:45	17:27
50	05:59	06:38	07:14	16:15	16:51	17:30
45	05:51	06:27	06:58	16:31	17:02	17:38
40	05:44	06:17	06:46	16:43	17:12	17:45
35	05:37	06:08	06:35	16:54	17:21	17:52
30	05:31	06:00	06:26	17:04	17:29	17:58
20	05:19	05:46	06:09	17:20	17:43	18:10
10	05:07	05:33	05:55	17:35	17:57	18:22
0	04:54	05:19	05:41	17:48	18:10	18:35
-10	04:39	05:05	05:27	18:02	18:24	18:50
-20	04:21	04:49	05:13	18:17	18:41	19:09
-30	03:58	04:29	04:56	18:34	19:00	19:32
-35	03:44	04:18	04:46	18:44	19:12	19:46
-40	03:26	04:04	04:34	18:56	19:27	20:04
-45	03:03	03:46	04:20	19:10	19:44	20:27
-50	02:33	03:25	04:04	19:27	20:06	20:58
-52	02:17	03:14	03:56	19:35	20:17	21:15
-54	01:57	03:02	03:47	19:43	20:29	21:35
-56	01:32	02:48	03:37	19:53	20:43	22:01
-58	00:55	02:31	03:26	20:05	21:00	22:40
-60	–:–	02:10	03:13	20:18	21:22	–:–

Lat.	**Moonrise**			**Moonset**		
	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	–:–	–:–	–:–	–:–	–:–	–:–
66	15:48	16:26	17:51	12:43	14:02	14:35
64	16:30	17:16	18:31	12:01	13:12	13:55
62	16:59	17:48	18:59	11:33	12:40	13:27
60	17:21	18:11	19:20	11:11	12:17	13:06
58	17:39	18:30	19:38	10:53	11:58	12:48
56	17:54	18:46	19:52	10:38	11:42	12:33
54	18:07	18:60	20:05	10:26	11:28	12:20
52	18:18	19:11	20:16	10:14	11:16	12:09
50	18:28	19:22	20:26	10:04	11:06	11:59
45	18:50	19:44	20:47	09:44	10:44	11:38
40	19:07	20:02	21:03	09:27	10:26	11:21
35	19:21	20:16	21:17	09:12	10:11	11:06
30	19:34	20:29	21:30	09:00	09:58	10:54
20	19:56	20:51	21:50	08:39	09:36	10:32
10	20:15	21:11	22:09	08:21	09:17	10:13
0	20:32	21:29	22:25	08:04	08:59	09:56
-10	20:50	21:47	22:42	07:47	08:41	09:38
-20	21:09	22:06	23:00	07:28	08:22	09:19
-30	21:31	22:28	23:21	07:07	07:60	08:58
-35	21:44	22:41	23:33	06:55	07:47	08:45
-40	21:59	22:56	23:47	06:41	07:32	08:30
-45	22:16	23:14	–:–	06:24	07:14	08:12
-50	22:38	23:36	–:–	06:04	06:52	07:50
-52	22:49	23:46	–:–	05:54	06:41	07:40
-54	23:01	23:58	–:–	05:43	06:29	07:28
-56	23:14	–:–	00:12	05:30	06:15	07:15
-58	23:30	–:–	00:28	05:16	05:60	06:59
-60	23:49	–:–	00:47	04:59	05:40	06:40

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	15:34	15:29	11:44	01:50	14:17	18(91%)
16	15:24	15:19	11:44	02:45	15:13	19(84%)
17	15:13	15:08	11:44	03:42	16:10	20(75%)

November 18, 19 ,20 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	56°44.9	157°39.2	-24°04.4	209°24.3	-10°29.3	150°14.6	-23°14.1	128°35.6	-22°16.7
1	71°47.4	172°38.3	-24°04.8	224°25.2	-10°29.9	165°16.5	-23°14.2	143°37.9	-22°16.7
2	86°49.9	187°37.4	-24°05.1	239°26.1	-10°30.5	180°18.3	-23°14.2	158°40.1	-22°16.6
3	101°52.3	202°36.5	-24°05.4	254°27.0	-10°31.1	195°20.2	-23°14.2	173°42.3	-22°16.6
4	116°54.8	217°35.5	-24°05.7	269°27.9	-10°31.7	210°22.1	-23°14.2	188°44.5	-22°16.6
5	131°57.2	232°34.6	-24°06.1	284°28.8	-10°32.3	225°24.0	-23°14.2	203°46.8	-22°16.6
6	146°59.7	247°33.7	-24°06.4	299°29.7	-10°32.9	240°25.9	-23°14.2	218°49.0	-22°16.5
7	162°02.2	262°32.8	-24°06.7	314°30.6	-10°33.5	255°27.8	-23°14.3	233°51.2	-22°16.5
8	177°04.6	277°31.9	-24°07.0	329°31.6	-10°34.1	270°29.7	-23°14.3	248°53.4	-22°16.5
9	192°07.1	292°30.9	-24°07.3	344°32.5	-10°34.7	285°31.6	-23°14.3	263°55.7	-22°16.5
10	207°09.6	307°30.0	-24°07.7	359°33.4	-10°35.2	300°33.5	-23°14.3	278°57.9	-22°16.5
11	222°12.0	322°29.1	-24°08.0	14°34.3	-10°35.8	315°35.3	-23°14.3	294°00.1	-22°16.4
12	237°14.5	337°28.2	-24°08.3	29°35.2	-10°36.4	330°37.2	-23°14.3	309°02.4	-22°16.4
13	252°17.0	352°27.3	-24°08.6	44°36.1	-10°37.0	345°39.1	-23°14.4	324°04.6	-22°16.4
14	267°19.4	7°26.4	-24°08.9	59°37.0	-10°37.6	0°41.0	-23°14.4	339°06.8	-22°16.4
15	282°21.9	22°25.4	-24°09.2	74°37.9	-10°38.2	15°42.9	-23°14.4	354°09.0	-22°16.3
16	297°24.3	37°24.5	-24°09.5	89°38.8	-10°38.8	30°44.8	-23°14.4	9°11.3	-22°16.3
17	312°26.8	52°23.6	-24°09.9	104°39.7	-10°39.4	45°46.7	-23°14.4	24°13.5	-22°16.3
18	327°29.3	67°22.7	-24°10.2	119°40.6	-10°40.0	60°48.6	-23°14.4	39°15.7	-22°16.3
19	342°31.7	82°21.8	-24°10.5	134°41.5	-10°40.6	75°50.4	-23°14.5	54°17.9	-22°16.2
20	357°34.2	97°20.8	-24°10.8	149°42.4	-10°41.2	90°52.3	-23°14.5	69°20.2	-22°16.2
21	12°36.7	112°19.9	-24°11.1	164°43.3	-10°41.8	105°54.2	-23°14.5	84°22.4	-22°16.2
22	27°39.1	127°19.0	-24°11.4	179°44.2	-10°42.4	120°56.1	-23°14.5	99°24.6	-22°16.2
23	42°41.6	142°18.1	-24°11.7	194°45.1	-10°43.0	135°58.0	-23°14.5	114°26.8	-22°16.1
Mer.pass.:20:09		v-0.9 d-0.3 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	57°44.1	157°17.2	-24°12.0	209°46.0	-10°43.6	150°59.9	-23°14.5	129°29.1	-22°16.1
1	72°46.5	172°16.2	-24°12.3	224°46.9	-10°44.2	166°01.8	-23°14.6	144°31.3	-22°16.1
2	87°49.0	187°15.3	-24°12.6	239°47.8	-10°44.8	181°03.7	-23°14.6	159°33.5	-22°16.1
3	102°51.5	202°14.4	-24°12.9	254°48.7	-10°45.3	196°05.5	-23°14.6	174°35.7	-22°16.0
4	117°53.9	217°13.5	-24°13.2	269°49.6	-10°45.9	211°07.4	-23°14.6	189°38.0	-22°16.0
5	132°56.4	232°12.5	-24°13.5	284°50.5	-10°46.5	226°09.3	-23°14.6	204°40.2	-22°16.0
6	147°58.8	247°11.6	-24°13.8	299°51.5	-10°47.1	241°11.2	-23°14.6	219°42.4	-22°16.0
7	163°01.3	262°10.7	-24°14.1	314°52.4	-10°47.7	256°13.1	-23°14.7	234°44.6	-22°15.9
8	178°03.8	277°09.8	-24°14.4	329°53.3	-10°48.3	271°15.0	-23°14.7	249°46.9	-22°15.9
9	193°06.2	292°08.9	-24°14.6	344°54.2	-10°48.9	286°16.9	-23°14.7	264°49.1	-22°15.9
10	208°08.7	307°07.9	-24°14.9	359°55.1	-10°49.5	301°18.8	-23°14.7	279°51.3	-22°15.9
11	223°11.2	322°07.0	-24°15.2	14°56.0	-10°50.1	316°20.6	-23°14.7	294°53.5	-22°15.8
12	238°13.6	337°06.1	-24°15.5	29°56.9	-10°50.7	331°22.5	-23°14.7	309°55.8	-22°15.8
13	253°16.1	352°05.2	-24°15.8	44°57.8	-10°51.3	346°24.4	-23°14.8	324°58.0	-22°15.8
14	268°18.6	7°04.2	-24°16.1	59°58.7	-10°51.9	1°26.3	-23°14.8	340°00.2	-22°15.8
15	283°21.0	22°03.3	-24°16.4	74°59.6	-10°52.5	16°28.2	-23°14.8	355°02.4	-22°15.7
16	298°23.5	37°02.4	-24°16.6	90°00.5	-10°53.0	31°30.1	-23°14.8	10°04.7	-22°15.7
17	313°26.0	52°01.5	-24°16.9	105°01.4	-10°53.6	46°31.9	-23°14.8	25°06.9	-22°15.7
18	328°28.4	67°00.5	-24°17.2	120°02.3	-10°54.2	61°33.8	-23°14.8	40°09.1	-22°15.7
19	343°30.9	81°59.6	-24°17.5	135°03.2	-10°54.8	76°35.7	-23°14.9	55°11.3	-22°15.7
20	358°33.3	96°58.7	-24°17.8	150°04.1	-10°55.4	91°37.6	-23°14.9	70°13.6	-22°15.6
21	13°35.8	111°57.8	-24°18.0	165°05.0	-10°56.0	106°39.5	-23°14.9	85°15.8	-22°15.6
22	28°38.3	126°56.8	-24°18.3	180°05.9	-10°56.6	121°41.4	-23°14.9	100°18.0	-22°15.6
23	43°40.7	141°55.9	-24°18.6	195°06.8	-10°57.2	136°43.3	-23°14.9	115°20.2	-22°15.6
Mer.pass.:20:05		v-0.9 d-0.3 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	58°43.2	156°55.0	-24°18.8	210°07.7	-10°57.8	151°45.1	-23°14.9	130°22.5	-22°15.5
1	73°45.7	171°54.0	-24°19.1	225°08.6	-10°58.4	166°47.0	-23°15.0	145°24.7	-22°15.5
2	88°48.1	186°53.1	-24°19.4	240°09.5	-10°59.0	181°48.9	-23°15.0	160°26.9	-22°15.5
3	103°50.6	201°52.2	-24°19.6	255°10.4	-10°59.5	196°50.8	-23°15.0	175°29.1	-22°15.5
4	118°53.1	216°51.3	-24°19.9	270°11.3	-11°00.1	211°52.7	-23°15.0	190°31.3	-22°15.4
5	133°55.5	231°50.3	-24°20.2	285°12.2	-11°00.7	226°54.6	-23°15.0	205°33.6	-22°15.4
6	148°58.0	246°49.4	-24°20.4	300°13.1	-11°01.3	241°56.4	-23°15.0	220°35.8	-22°15.4
7	164°00.4	261°48.5	-24°20.7	315°14.0	-11°01.9	256°58.3	-23°15.0	235°38.0	-22°15.4
8	179°02.9	276°47.5	-24°21.0	330°14.9	-11°02.5	272°00.2	-23°15.1	250°40.2	-22°15.3
9	194°05.4	291°46.6	-24°21.2	345°15.8	-11°03.1	287°02.1	-23°15.1	265°42.5	-22°15.3
10	209°07.8	306°45.7	-24°21.5	0°16.7	-11°03.7	302°04.0	-23°15.1	280°44.7	-22°15.3
11	224°10.3	321°44.8	-24°21.7	15°17.6	-11°04.3	317°05.9	-23°15.1	295°46.9	-22°15.3
12	239°12.8	336°43.8	-24°22.0	30°18.5	-11°04.8	332°07.7	-23°15.1	310°49.1	-22°15.2
13	254°15.2	351°42.9	-24°22.2	45°19.4	-11°05.4	347°09.6	-23°15.1	325°51.3	-22°15.2
14	269°17.7	6°42.0	-24°22.5	60°20.3	-11°06.0	2°11.5	-23°15.2	340°53.6	-22°15.2
15	284°20.2	21°41.0	-24°22.8	75°21.2	-11°06.6	17°13.4	-23°15.2	355°55.8	-22°15.2
16	299°22.6	36°40.1	-24°23.0	90°22.1	-11°07.2	32°15.3	-23°15.2	10°58.0	-22°15.1
17	314°25.1	51°39.2	-24°23.3	105°23.0	-11°07.8	47°17.2	-23°15.2	26°00.2	-22°15.1
18	329°27.6	66°38.2	-24°23.5	120°23.9	-11°08.4	62°19.0	-23°15.2	41°02.4	-22°15.1
19	344°30.0	81°37.3	-24°23.7	135°24.8	-11°09.0	77°20.9	-23°15.2	56°04.7	-22°15.1
20	359°32.5	96°36.4	-24°24.0	150°25.7	-11°09.6	92°22.8	-23°15.2	71°06.9	-22°15.0
21	14°34.9	111°35.4	-24°24.2	165°26.6	-11°10.1	107°24.7	-23°15.3	86°09.1	-22°15.0
22	29°37.4	126°34.5	-24°24.5	180°27.5	-11°10.7	122°26.6	-23°15.3	101°11.3	-22°15.0
23	44°39.9	141°33.6	-24°24.7	195°28.4	-11°11.3	137°28.5	-23°15.3	116°13.5	-22°15.0
Mer.pass.:20:01		v-0.9 d-0.3 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.1
Schedar	349°35.2	56°38.9
Diphda	348°51.1	-17°52.8
Achernar	335°23.0	-57°08.4
Hamal	327°55.5	23°33.4
Polaris	315°23.8	89°20.8
Akamar	315°14.6	-40°13.7
Menkar	314°10.1	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.5	46°01.0
Bellatrix	278°27.0	6°22.0
Elnath	278°06.7	28°37.3
Alnilam	275°41.6	-1°11.4
Betelgeuse	270°56.3	7°24.6
Canopus	263°53.8	-52°42.3
Sirius	258°29.5	-16°44.4
Adara	255°08.8	-28°59.8
Procyon	244°54.9	5°10.6
Pollux	243°22.1	27°58.6
Avior	234°16.0	-59°34.1
Suhail	222°49.1	-43°30.5
Miaplacidus	221°38.7	-69°47.6
Alphard	217°51.7	-8°44.5
Regulus	207°38.8	11°52.3
Dubhe	193°46.5	61°38.5
Denebola	182°29.3	14°27.8
Gienah	175°48.0	-17°38.9
Acrux	173°04.9	-63°12.1
Gacrux	171°56.4	-57°13.1
Alioth	166°17.2	55°51.1
Spica	158°26.9	-11°15.6
Alcaid	152°55.8	49°12.9
Hadar	148°42.3	-60°27.8
Menkent	148°02.8	-36°27.7
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.4	-60°54.7
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.5
Alphecca	126°07.7	26°39.1
Antares	112°21.2	-26°28.3
Atria	107°19.7	-69°03.7
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°33.0
Etamin	90°44.6	51°29.4
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.4
Nunki	75°53.2	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.6	-56°40.4
Deneb	49°28.7	45°21.3
Enif	33°42.9	9°58.1
Alnair	27°38.2	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/11/	**SHA**	**Mer.pass**
Venus	100°54.3	13:30
Mars	152°39.4	10:02
Jupiter	93°29.6	13:57
Saturn	71°50.7	15:23

2019/11/	**SHA**	**Mer.pass**
Venus	99°33.1	13:32
Mars	152°02.0	10:00
Jupiter	93°15.8	13:54
Saturn	71°45.0	15:20

2019/11/	**SHA**	**Mer.pass**
Venus	98°11.8	13:33
Mars	151°24.5	09:59
Jupiter	93°01.9	13:51
Saturn	71°39.3	15:16

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	183°45.4	-19°05.6	292°54.0	7.0	21°47.3	-4.8	58.2
1	198°45.3	-19°06.2	307°20.0	7.0	21°42.4	-4.9	58.3
2	213°45.1	-19°06.8	321°46.0	7.0	21°37.5	-5.0	58.3
3	228°45.0	-19°07.4	336°12.0	7.0	21°32.4	-5.2	58.3
4	243°44.9	-19°08.0	350°38.1	7.1	21°27.1	-5.3	58.3
5	258°44.8	-19°08.6	5°04.1	7.1	21°21.7	-5.4	58.3
6	273°44.6	-19°09.2	19°30.2	7.1	21°16.2	-5.6	58.3
7	288°44.5	-19°09.8	33°56.4	7.1	21°10.6	-5.7	58.4
8	303°44.4	-19°10.4	48°22.5	7.2	21°04.8	-5.8	58.4
9	318°44.3	-19°11.0	62°48.7	7.2	20°58.9	-6.0	58.4
10	333°44.1	-19°11.6	77°14.9	7.2	20°52.8	-6.1	58.4
11	348°44.0	-19°12.2	91°41.1	7.2	20°46.7	-6.2	58.4
12	3°43.9	-19°12.8	106°07.3	7.3	20°40.4	-6.4	58.5
13	18°43.7	-19°13.4	120°33.6	7.3	20°33.9	-6.5	58.5
14	33°43.6	-19°14.0	134°60.0	7.3	20°27.4	-6.6	58.5
15	48°43.5	-19°14.6	149°26.3	7.4	20°20.7	-6.8	58.5
16	63°43.3	-19°15.2	163°52.7	7.4	20°13.9	-6.9	58.5
17	78°43.2	-19°15.8	178°19.1	7.4	20°06.9	-7.0	58.5
18	93°43.1	-19°16.4	192°45.5	7.5	19°59.8	-7.1	58.6
19	108°42.9	-19°17.0	207°12.0	7.5	19°52.6	-7.3	58.6
20	123°42.8	-19°17.6	221°38.5	7.5	19°45.3	-7.4	58.6
21	138°42.7	-19°18.2	236°05.1	7.6	19°37.9	-7.5	58.6
22	153°42.5	-19°18.8	250°31.7	7.6	19°30.3	-7.6	58.6
23	168°42.4	-19°19.4	264°58.3	7.6	19°22.6	-7.7	58.7
	SD.=16.2	d=-0.6			S.D.=15.9		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	183°42.3	-19°19.9	279°25.0	7.7	19°14.8	-7.9	58.7
1	198°42.1	-19°20.5	293°51.6	7.7	19°06.9	-8.0	58.7
2	213°42.0	-19°21.1	308°18.4	7.8	18°58.8	-8.1	58.7
3	228°41.9	-19°21.7	322°45.2	7.8	18°50.7	-8.2	58.7
4	243°41.7	-19°22.3	337°12.0	7.8	18°42.4	-8.3	58.7
5	258°41.6	-19°22.9	351°38.8	7.9	18°34.0	-8.5	58.8
6	273°41.5	-19°23.5	6°05.7	7.9	18°25.5	-8.6	58.8
7	288°41.3	-19°24.1	20°32.6	7.9	18°16.8	-8.7	58.8
8	303°41.2	-19°24.6	34°59.6	8.0	18°08.1	-8.8	58.8
9	318°41.1	-19°25.2	49°26.6	8.0	17°59.2	-8.9	58.8
10	333°40.9	-19°25.8	63°53.6	8.1	17°50.3	-9.0	58.8
11	348°40.8	-19°26.4	78°20.7	8.1	17°41.2	-9.1	58.9
12	3°40.6	-19°27.0	92°47.9	8.1	17°32.0	-9.2	58.9
13	18°40.5	-19°27.6	107°15.0	8.2	17°22.7	-9.4	58.9
14	33°40.4	-19°28.1	121°42.2	8.2	17°13.3	-9.5	58.9
15	48°40.2	-19°28.7	136°09.5	8.3	17°03.8	-9.6	58.9
16	63°40.1	-19°29.3	150°36.8	8.3	16°54.1	-9.7	58.9
17	78°39.9	-19°29.9	165°04.1	8.4	16°44.4	-9.8	59.0
18	93°39.8	-19°30.5	179°31.5	8.4	16°34.6	-9.9	59.0
19	108°39.7	-19°31.0	193°58.9	8.4	16°24.6	-10.0	59.0
20	123°39.5	-19°31.6	208°26.3	8.5	16°14.6	-10.1	59.0
21	138°39.4	-19°32.2	222°53.8	8.5	16°04.5	-10.2	59.0
22	153°39.2	-19°32.8	237°21.4	8.6	15°54.2	-10.3	59.0
23	168°39.1	-19°33.3	251°49.0	8.6	15°43.9	-10.4	59.1
	SD.=16.2	d=-0.6			S.D.=16.0		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	183°39.0	-19°33.9	266°16.6	8.6	15°33.4	-10.5	59.1
1	198°38.8	-19°34.5	280°44.2	8.7	15°22.9	-10.6	59.1
2	213°38.7	-19°35.1	295°11.9	8.7	15°12.3	-10.7	59.1
3	228°38.5	-19°35.6	309°39.7	8.8	15°01.6	-10.8	59.1
4	243°38.4	-19°36.2	324°07.5	8.8	14°50.7	-10.9	59.1
5	258°38.2	-19°36.8	338°35.3	8.8	14°39.8	-11.0	59.1
6	273°38.1	-19°37.3	353°03.1	8.9	14°28.8	-11.0	59.2
7	288°37.9	-19°37.9	7°31.0	8.9	14°17.7	-11.1	59.2
8	303°37.8	-19°38.5	21°59.0	9.0	14°06.6	-11.2	59.2
9	318°37.6	-19°39.1	36°27.0	9.0	13°55.3	-11.3	59.2
10	333°37.5	-19°39.6	50°55.0	9.0	13°43.9	-11.4	59.2
11	348°37.4	-19°40.2	65°23.0	9.1	13°32.5	-11.5	59.2
12	3°37.2	-19°40.8	79°51.1	9.1	13°21.0	-11.6	59.2
13	18°37.1	-19°41.3	94°19.2	9.1	13°09.4	-11.6	59.3
14	33°36.9	-19°41.9	108°47.4	9.2	12°57.7	-11.7	59.3
15	48°36.8	-19°42.5	123°15.6	9.2	12°45.9	-11.8	59.3
16	63°36.6	-19°43.0	137°43.9	9.3	12°34.1	-11.9	59.3
17	78°36.5	-19°43.6	152°12.1	9.3	12°22.1	-12.0	59.3
18	93°36.3	-19°44.1	166°40.5	9.3	12°10.1	-12.0	59.3
19	108°36.2	-19°44.7	181°08.8	9.4	11°58.1	-12.1	59.3
20	123°36.0	-19°45.3	195°37.2	9.4	11°45.9	-12.2	59.4
21	138°35.9	-19°45.8	210°05.6	9.4	11°33.7	-12.3	59.4
22	153°35.7	-19°46.4	224°34.1	9.5	11°21.4	-12.3	59.4
23	168°35.6	-19°47.0	239°02.5	9.5	11°09.0	-12.4	59.4
	SD.=16.2	d=-0.6			S.D.=16.1		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:12	08:52	–:–	–:–	14:38	16:17
70	07:01	08:26	10:15	13:14	15:04	16:29
68	06:51	08:06	09:30	13:59	15:24	16:38
66	06:43	07:50	09:01	14:29	15:39	16:47
64	06:36	07:37	08:39	14:51	15:52	16:54
62	06:30	07:26	08:21	15:08	16:04	17:00
60	06:24	07:17	08:07	15:23	16:13	17:06
58	06:19	07:08	07:55	15:35	16:22	17:11
56	06:15	07:01	07:44	15:46	16:29	17:15
54	06:10	06:54	07:34	15:56	16:36	17:20
52	06:06	06:48	07:26	16:04	16:42	17:24
50	06:03	06:43	07:19	16:12	16:48	17:27
45	05:54	06:30	07:02	16:28	16:60	17:36
40	05:47	06:20	06:49	16:41	17:10	17:43
35	05:40	06:11	06:38	16:52	17:19	17:50
30	05:33	06:03	06:28	17:02	17:28	17:57
20	05:21	05:48	06:11	17:20	17:43	18:10
10	05:08	05:34	05:56	17:35	17:57	18:23
0	04:54	05:20	05:42	17:49	18:11	18:36
-10	04:39	05:05	05:27	18:03	18:26	18:52
-20	04:20	04:48	05:12	18:19	18:43	19:11
-30	03:56	04:28	04:54	18:37	19:03	19:35
-35	03:41	04:16	04:44	18:47	19:16	19:50
-40	03:23	04:01	04:32	18:59	19:30	20:09
-45	02:59	03:43	04:18	19:14	19:48	20:33
-50	02:27	03:20	04:00	19:31	20:11	21:05
-52	02:10	03:09	03:52	19:40	20:23	21:23
-54	01:49	02:56	03:43	19:49	20:36	21:44
-56	01:21	02:41	03:32	19:60	20:51	22:14
-58	00:34	02:23	03:20	20:12	21:09	23:05
-60	–:–	02:01	03:06	20:26	21:32	–:–

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	–:–	19:55	22:35	–:–	16:28	15:40
70	17:30	20:40	22:54	16:56	15:41	15:18
68	19:01	21:09	23:10	15:24	15:11	15:01
66	19:39	21:31	23:22	14:45	14:48	14:48
64	20:06	21:49	23:32	14:18	14:29	14:36
62	20:27	22:03	23:41	13:56	14:14	14:26
60	20:44	22:15	23:48	13:39	14:02	14:18
58	20:58	22:25	23:55	13:24	13:51	14:10
56	21:10	22:34	–:–	13:12	13:41	14:04
54	21:20	22:42	–:–	13:01	13:33	13:58
52	21:30	22:49	–:–	12:51	13:25	13:52
50	21:38	22:55	–:–	12:42	13:18	13:47
45	21:56	23:09	–:–	12:24	13:03	13:37
40	22:10	23:20	–:–	12:09	12:51	13:28
35	22:22	23:29	–:–	11:56	12:40	13:20
30	22:33	23:38	–:–	11:45	12:31	13:13
20	22:51	23:52	–:–	11:25	12:15	13:02
10	23:07	–:–	00:04	11:08	12:01	12:51
0	23:22	–:–	00:16	10:52	11:48	12:41
-10	23:36	–:–	00:28	10:36	11:34	12:32
-20	23:52	–:–	00:40	10:19	11:20	12:21
-30	–:–	00:10	00:54	09:59	11:04	12:09
-35	–:–	00:20	01:02	09:48	10:54	12:02
-40	–:–	00:32	01:12	09:34	10:43	11:54
-45	00:04	00:46	01:22	09:18	10:30	11:44
-50	00:24	01:03	01:35	08:59	10:14	11:32
-52	00:34	01:11	01:41	08:50	10:06	11:27
-54	00:44	01:20	01:48	08:39	09:58	11:21
-56	00:57	01:30	01:55	08:27	09:49	11:14
-58	01:11	01:41	02:04	08:13	09:38	11:07
-60	01:27	01:54	02:13	07:57	09:25	10:58

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	15:02	14:56	11:45	04:38	17:06	21(65%)
19	14:49	14:43	11:45	05:34	18:01	22(54%)
20	14:36	14:29	11:45	06:28	18:55	23(43%)

November 21, 22 ,23 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	59°42.3	156°32.7	-24°25.0	210°29.3	-11°11.9	152°30.3	-23°15.3	131°15.8	-22°14.9
1	74°44.8	171°31.7	-24°25.2	225°30.1	-11°12.5	167°32.2	-23°15.3	146°18.0	-22°14.9
2	89°47.3	186°30.8	-24°25.4	240°31.0	-11°13.1	182°34.1	-23°15.3	161°20.2	-22°14.9
3	104°49.7	201°29.9	-24°25.7	255°31.9	-11°13.7	197°36.0	-23°15.3	176°22.4	-22°14.9
4	119°52.2	216°28.9	-24°25.9	270°32.8	-11°14.3	212°37.9	-23°15.4	191°24.6	-22°14.8
5	134°54.7	231°28.0	-24°26.1	285°33.7	-11°14.8	227°39.7	-23°15.4	206°26.9	-22°14.8
6	149°57.1	246°27.1	-24°26.4	300°34.6	-11°15.4	242°41.6	-23°15.4	221°29.1	-22°14.8
7	164°59.6	261°26.1	-24°26.6	315°35.5	-11°16.0	257°43.5	-23°15.4	236°31.3	-22°14.8
8	180°02.1	276°25.2	-24°26.8	330°36.4	-11°16.6	272°45.4	-23°15.4	251°33.5	-22°14.7
9	195°04.5	291°24.3	-24°27.1	345°37.3	-11°17.2	287°47.3	-23°15.4	266°35.7	-22°14.7
10	210°07.0	306°23.3	-24°27.3	0°38.2	-11°17.8	302°49.2	-23°15.4	281°38.0	-22°14.7
11	225°09.4	321°22.4	-24°27.5	15°39.1	-11°18.4	317°51.0	-23°15.5	296°40.2	-22°14.6
12	240°11.9	336°21.5	-24°27.7	30°40.0	-11°18.9	332°52.9	-23°15.5	311°42.4	-22°14.6
13	255°14.4	351°20.5	-24°28.0	45°40.9	-11°19.5	347°54.8	-23°15.5	326°44.6	-22°14.6
14	270°16.8	6°19.6	-24°28.2	60°41.8	-11°20.1	2°56.7	-23°15.5	341°46.8	-22°14.6
15	285°19.3	21°18.6	-24°28.4	75°42.7	-11°20.7	17°58.6	-23°15.5	356°49.1	-22°14.5
16	300°21.8	36°17.7	-24°28.6	90°43.6	-11°21.3	33°00.4	-23°15.5	11°51.3	-22°14.5
17	315°24.2	51°16.8	-24°28.9	105°44.5	-11°21.9	48°02.3	-23°15.6	26°53.5	-22°14.5
18	330°26.7	66°15.8	-24°29.1	120°45.4	-11°22.5	63°04.2	-23°15.6	41°55.7	-22°14.5
19	345°29.2	81°14.9	-24°29.3	135°46.3	-11°23.0	78°06.1	-23°15.6	56°57.9	-22°14.4
20	0°31.6	96°14.0	-24°29.5	150°47.2	-11°23.6	93°08.0	-23°15.6	72°00.1	-22°14.4
21	15°34.1	111°13.0	-24°29.7	165°48.1	-11°24.2	108°09.8	-23°15.6	87°02.4	-22°14.4
22	30°36.5	126°12.1	-24°29.9	180°49.0	-11°24.8	123°11.7	-23°15.6	102°04.6	-22°14.4
23	45°39.0	141°11.2	-24°30.1	195°49.8	-11°25.4	138°13.6	-23°15.6	117°06.8	-22°14.3
	Mer.pass.:19:57	v-0.9 d-0.2 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	60°41.5	156°10.2	-24°30.3	210°50.7	-11°26.0	153°15.5	-23°15.6	132°09.0	-22°14.3
1	75°43.9	171°09.3	-24°30.6	225°51.6	-11°26.5	168°17.4	-23°15.7	147°11.2	-22°14.3
2	90°46.4	186°08.3	-24°30.8	240°52.5	-11°27.1	183°19.2	-23°15.7	162°13.5	-22°14.3
3	105°48.9	201°07.4	-24°31.0	255°53.4	-11°27.7	198°21.1	-23°15.7	177°15.7	-22°14.2
4	120°51.3	216°06.5	-24°31.2	270°54.3	-11°28.3	213°23.0	-23°15.7	192°17.9	-22°14.2
5	135°53.8	231°05.5	-24°31.4	285°55.2	-11°28.9	228°24.9	-23°15.7	207°20.1	-22°14.2
6	150°56.3	246°04.6	-24°31.6	300°56.1	-11°29.5	243°26.8	-23°15.7	222°22.3	-22°14.2
7	165°58.7	261°03.7	-24°31.8	315°57.0	-11°30.1	258°28.6	-23°15.7	237°24.5	-22°14.1
8	181°01.2	276°02.7	-24°32.0	330°57.9	-11°30.6	273°30.5	-23°15.8	252°26.8	-22°14.1
9	196°03.7	291°01.8	-24°32.2	345°58.8	-11°31.2	288°32.4	-23°15.8	267°29.0	-22°14.1
10	211°06.1	306°00.8	-24°32.4	0°59.7	-11°31.8	303°34.3	-23°15.8	282°31.2	-22°14.1
11	226°08.6	320°59.9	-24°32.6	16°00.6	-11°32.4	318°36.1	-23°15.8	297°33.4	-22°14.0
12	241°11.0	335°59.0	-24°32.8	31°01.5	-11°33.0	333°38.0	-23°15.8	312°35.6	-22°14.0
13	256°13.5	350°58.0	-24°33.0	46°02.3	-11°33.5	348°39.9	-23°15.8	327°37.8	-22°14.0
14	271°16.0	5°57.1	-24°33.1	61°03.2	-11°34.1	3°41.8	-23°15.8	342°40.1	-22°14.0
15	286°18.4	20°56.1	-24°33.3	76°04.1	-11°34.7	18°43.7	-23°15.9	357°42.3	-22°13.9
16	301°20.9	35°55.2	-24°33.5	91°05.0	-11°35.3	33°45.5	-23°15.9	12°44.5	-22°13.9
17	316°23.4	50°54.3	-24°33.7	106°05.9	-11°35.9	48°47.4	-23°15.9	27°46.7	-22°13.9
18	331°25.8	65°53.3	-24°33.9	121°06.8	-11°36.5	63°49.3	-23°15.9	42°48.9	-22°13.9
19	346°28.3	80°52.4	-24°34.1	136°07.7	-11°37.0	78°51.2	-23°15.9	57°51.1	-22°13.8
20	1°30.8	95°51.4	-24°34.3	151°08.6	-11°37.6	93°53.0	-23°15.9	72°53.3	-22°13.8
21	16°33.2	110°50.5	-24°34.5	166°09.5	-11°38.2	108°54.9	-23°15.9	87°55.6	-22°13.8
22	31°35.7	125°49.6	-24°34.6	181°10.4	-11°38.8	123°56.8	-23°15.9	102°57.8	-22°13.7
23	46°38.2	140°48.6	-24°34.8	196°11.3	-11°39.4	138°58.7	-23°16.0	117°60.0	-22°13.7
	Mer.pass.:19:53	v-0.9 d-0.2 m-3.8		v0.9 d-0.6 m1.8		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	61°40.6	155°47.7	-24°35.0	211°12.1	-11°40.0	154°00.6	-23°16.0	133°02.2	-22°13.7
1	76°43.1	170°46.7	-24°35.2	226°13.0	-11°40.5	169°02.4	-23°16.0	148°04.4	-22°13.7
2	91°45.5	185°45.8	-24°35.4	241°13.9	-11°41.1	184°04.3	-23°16.0	163°06.6	-22°13.6
3	106°48.0	200°44.9	-24°35.5	256°14.8	-11°41.7	199°06.2	-23°16.0	178°08.9	-22°13.6
4	121°50.5	215°43.9	-24°35.7	271°15.7	-11°42.3	214°08.1	-23°16.0	193°11.1	-22°13.6
5	136°52.9	230°43.0	-24°35.9	286°16.6	-11°42.9	229°09.9	-23°16.0	208°13.3	-22°13.6
6	151°55.4	245°42.0	-24°36.0	301°17.5	-11°43.4	244°11.8	-23°16.1	223°15.5	-22°13.5
7	166°57.9	260°41.1	-24°36.2	316°18.4	-11°44.0	259°13.7	-23°16.1	238°17.7	-22°13.5
8	182°00.3	275°40.2	-24°36.4	331°19.3	-11°44.6	274°15.6	-23°16.1	253°19.9	-22°13.5
9	197°02.8	290°39.2	-24°36.5	346°20.1	-11°45.2	289°17.4	-23°16.1	268°22.1	-22°13.5
10	212°05.3	305°38.3	-24°36.7	1°21.0	-11°45.8	304°19.3	-23°16.1	283°24.4	-22°13.4
11	227°07.7	320°37.3	-24°36.9	16°21.9	-11°46.3	319°21.2	-23°16.1	298°26.6	-22°13.4
12	242°10.2	335°36.4	-24°37.0	31°22.8	-11°46.9	334°23.1	-23°16.1	313°28.8	-22°13.4
13	257°12.6	350°35.4	-24°37.2	46°23.7	-11°47.5	349°25.0	-23°16.1	328°31.0	-22°13.4
14	272°15.1	5°34.5	-24°37.4	61°24.6	-11°48.1	4°26.8	-23°16.2	343°33.2	-22°13.3
15	287°17.6	20°33.6	-24°37.5	76°25.5	-11°48.7	19°28.7	-23°16.2	358°35.4	-22°13.3
16	302°20.0	35°32.6	-24°37.7	91°26.4	-11°49.2	34°30.6	-23°16.2	13°37.6	-22°13.3
17	317°22.5	50°31.7	-24°37.8	106°27.3	-11°49.8	49°32.5	-23°16.2	28°39.8	-22°13.2
18	332°25.0	65°30.7	-24°38.0	121°28.1	-11°50.4	64°34.3	-23°16.2	43°42.1	-22°13.2
19	347°27.4	80°29.8	-24°38.2	136°29.0	-11°51.0	79°36.2	-23°16.2	58°44.3	-22°13.2
20	2°29.9	95°28.8	-24°38.3	151°29.9	-11°51.5	94°38.1	-23°16.2	73°46.5	-22°13.2
21	17°32.4	110°27.9	-24°38.5	166°30.8	-11°52.1	109°40.0	-23°16.2	88°48.7	-22°13.1
22	32°34.8	125°27.0	-24°38.6	181°31.7	-11°52.7	124°41.8	-23°16.3	103°50.9	-22°13.1
23	47°37.3	140°26.0	-24°38.8	196°32.6	-11°53.3	139°43.7	-23°16.3	118°53.1	-22°13.1
	Mer.pass.:19:50	v-0.9 d-0.2 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.1
Schedar	349°35.2	56°38.9
Diphda	348°51.2	-17°52.8
Achernar	335°23.0	-57°08.4
Hamal	327°55.5	23°33.4
Polaris	315°24.0	89°20.9
Akamar	315°14.6	-40°13.7
Menkar	314°10.1	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.5	46°01.0
Bellatrix	278°27.0	6°22.0
Elnath	278°06.7	28°37.3
Alnilam	275°41.6	-1°11.4
Betelgeuse	270°56.3	7°24.6
Canopus	263°53.8	-52°42.3
Sirius	258°29.5	-16°44.4
Adara	255°08.8	-28°59.9
Procyon	244°54.9	5°10.6
Pollux	243°22.1	27°58.6
Avior	234°16.0	-59°34.1
Suhail	222°49.1	-43°30.5
Miaplacidus	221°38.6	-69°47.6
Alphard	217°51.7	-8°44.5
Regulus	207°38.8	11°52.2
Dubhe	193°46.4	61°38.5
Denebola	182°29.3	14°27.8
Gienah	175°47.9	-17°38.9
Acrux	173°04.9	-63°12.1
Gacrux	171°56.4	-57°13.1
Alioth	166°17.2	55°51.1
Spica	158°26.9	-11°15.6
Alcaid	152°55.8	49°12.9
Hadar	148°42.3	-60°27.8
Menkent	148°02.8	-36°27.7
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.4	-60°54.7
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.5
Alphecca	126°07.7	26°39.1
Antares	112°21.2	-26°28.3
Atria	107°19.7	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.4	-37°06.9
Rasalhague	96°02.7	12°33.0
Etamin	90°44.6	51°29.4
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.6	-56°40.4
Deneb	49°28.7	45°21.3
Enif	33°42.9	9°58.1
Alnair	27°38.2	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/11/	**SHA**	**Mer.pass**
Venus	96°50.3	13:35
Mars	150°46.9	09:57
Jupiter	92°48.0	13:48
Saturn	71°33.4	15:13

2019/11/	**SHA**	**Mer.pass**
Venus	95°28.7	13:36
Mars	150°09.3	09:56
Jupiter	92°34.0	13:45
Saturn	71°27.5	15:09

2019/11/	**SHA**	**Mer.pass**
Venus	94°07.1	13:38
Mars	149°31.5	09:55
Jupiter	92°19.9	13:42
Saturn	71°21.6	15:06

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°35.4	-19°47.5	253°31.1	9.5	10°56.6	-12.5	59.4
1	198°35.3	-19°48.1	267°59.6	9.6	10°44.1	-12.5	59.4
2	213°35.1	-19°48.6	282°28.2	9.6	10°31.5	-12.6	59.4
3	228°35.0	-19°49.2	296°56.8	9.6	10°18.9	-12.7	59.4
4	243°34.8	-19°49.8	311°25.4	9.7	10°06.2	-12.7	59.5
5	258°34.7	-19°50.3	325°54.1	9.7	9°53.4	-12.8	59.5
6	273°34.5	-19°50.9	340°22.8	9.7	9°40.6	-12.9	59.5
7	288°34.3	-19°51.4	354°51.5	9.7	9°27.7	-12.9	59.5
8	303°34.2	-19°52.0	9°20.3	9.8	9°14.7	-13.0	59.5
9	318°34.0	-19°52.5	23°49.1	9.8	9°01.7	-13.0	59.5
10	333°33.9	-19°53.1	38°17.9	9.8	8°48.7	-13.1	59.5
11	348°33.7	-19°53.6	52°46.7	9.8	8°35.5	-13.1	59.5
12	3°33.6	-19°54.2	67°15.6	9.9	8°22.4	-13.2	59.5
13	18°33.4	-19°54.7	81°44.5	9.9	8°09.1	-13.3	59.6
14	33°33.3	-19°55.3	96°13.4	9.9	7°55.9	-13.3	59.6
15	48°33.1	-19°55.8	110°42.3	9.9	7°42.5	-13.4	59.6
16	63°32.9	-19°56.4	125°11.3	10.0	7°29.2	-13.4	59.6
17	78°32.8	-19°56.9	139°40.2	10.0	7°15.7	-13.4	59.6
18	93°32.6	-19°57.5	154°09.2	10.0	7°02.3	-13.5	59.6
19	108°32.5	-19°58.0	168°38.2	10.0	6°48.8	-13.5	59.6
20	123°32.3	-19°58.6	183°07.3	10.0	6°35.2	-13.6	59.6
21	138°32.1	-19°59.1	197°36.3	10.1	6°21.6	-13.6	59.6
22	153°32.0	-19°59.7	212°05.4	10.1	6°08.0	-13.7	59.6
23	168°31.8	-20°00.2	226°34.5	10.1	5°54.3	-13.7	59.6
	SD.=16.2	d=-0.6			S.D.=16.2		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°31.7	-20°00.8	241°03.6	10.1	5°40.6	-13.7	59.7
1	198°31.5	-20°01.3	255°32.7	10.1	5°26.8	-13.8	59.7
2	213°31.3	-20°01.9	270°01.8	10.1	5°13.0	-13.8	59.7
3	228°31.2	-20°02.4	284°31.0	10.2	4°59.2	-13.8	59.7
4	243°31.0	-20°02.9	299°00.2	10.2	4°45.3	-13.9	59.7
5	258°30.9	-20°03.5	313°29.3	10.2	4°31.5	-13.9	59.7
6	273°30.7	-20°04.0	327°58.5	10.2	4°17.5	-13.9	59.7
7	288°30.5	-20°04.6	342°27.7	10.2	4°03.6	-14.0	59.7
8	303°30.4	-20°05.1	356°56.9	10.2	3°49.6	-14.0	59.7
9	318°30.2	-20°05.6	11°26.1	10.2	3°35.6	-14.0	59.7
10	333°30.0	-20°06.2	25°55.3	10.2	3°21.6	-14.0	59.7
11	348°29.9	-20°06.7	40°24.6	10.2	3°07.6	-14.1	59.7
12	3°29.7	-20°07.3	54°53.8	10.2	2°53.5	-14.1	59.7
13	18°29.6	-20°07.8	69°23.0	10.2	2°39.4	-14.1	59.7
14	33°29.4	-20°08.3	83°52.3	10.2	2°25.3	-14.1	59.7
15	48°29.2	-20°08.9	98°21.5	10.3	2°11.2	-14.1	59.8
16	63°29.1	-20°09.4	112°50.8	10.3	1°57.1	-14.1	59.8
17	78°28.9	-20°09.9	127°20.0	10.3	1°42.9	-14.2	59.8
18	93°28.7	-20°10.5	141°49.3	10.3	1°28.8	-14.2	59.8
19	108°28.6	-20°11.0	156°18.6	10.3	1°14.6	-14.2	59.8
20	123°28.4	-20°11.5	170°47.8	10.3	1°00.4	-14.2	59.8
21	138°28.2	-20°12.1	185°17.1	10.3	0°46.2	-14.2	59.8
22	153°28.1	-20°12.6	199°46.3	10.3	0°32.0	-14.2	59.8
23	168°27.9	-20°13.1	214°15.6	10.2	0°17.8	-14.2	59.8
	SD.=16.2	d=-0.5			S.D.=16.3		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°27.7	-20°13.7	228°44.8	10.2	0°03.6	-14.2	59.8
1	198°27.5	-20°14.2	243°14.1	10.2	-0°10.6	-14.2	59.8
2	213°27.4	-20°14.7	257°43.3	10.2	-0°24.8	-14.2	59.8
3	228°27.2	-20°15.2	272°12.5	10.2	-0°39.0	-14.2	59.8
4	243°27.0	-20°15.8	286°41.7	10.2	-0°53.3	-14.2	59.8
5	258°26.9	-20°16.3	301°11.0	10.2	-1°07.5	-14.2	59.8
6	273°26.7	-20°16.8	315°40.2	10.2	-1°21.7	-14.2	59.8
7	288°26.5	-20°17.3	330°09.4	10.2	-1°35.9	-14.2	59.8
8	303°26.4	-20°17.9	344°38.5	10.2	-1°50.1	-14.2	59.8
9	318°26.2	-20°18.4	359°07.7	10.2	-2°04.2	-14.2	59.8
10	333°26.0	-20°18.9	13°36.9	10.2	-2°18.4	-14.2	59.8
11	348°25.8	-20°19.4	28°06.0	10.1	-2°32.6	-14.2	59.8
12	3°25.7	-20°20.0	42°35.2	10.1	-2°46.7	-14.1	59.8
13	18°25.5	-20°20.5	57°04.3	10.1	-3°00.8	-14.1	59.8
14	33°25.3	-20°21.0	71°33.4	10.1	-3°14.9	-14.1	59.8
15	48°25.1	-20°21.5	86°02.5	10.1	-3°29.0	-14.1	59.8
16	63°25.0	-20°22.0	100°31.6	10.1	-3°43.1	-14.1	59.8
17	78°24.8	-20°22.6	115°00.6	10.0	-3°57.2	-14.0	59.8
18	93°24.6	-20°23.1	129°29.7	10.0	-4°11.2	-14.0	59.8
19	108°24.4	-20°23.6	143°58.7	10.0	-4°25.2	-14.0	59.8
20	123°24.3	-20°24.1	158°27.7	10.0	-4°39.2	-14.0	59.8
21	138°24.1	-20°24.6	172°56.7	10.0	-4°53.1	-13.9	59.8
22	153°23.9	-20°25.1	187°25.6	9.9	-5°07.1	-13.9	59.8
23	168°23.7	-20°25.7	201°54.5	9.9	-5°21.0	-13.9	59.8
	SD.=16.2	d=-0.5			S.D.=16.3		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:22	09:06	–:–	–:–	14:25	16:08
70	07:10	08:37	10:41	12:50	14:54	16:21
68	06:59	08:16	09:45	13:46	15:15	16:32
66	06:50	07:59	09:12	14:19	15:32	16:41
64	06:43	07:45	08:48	14:43	15:46	16:49
62	06:36	07:33	08:30	15:02	15:58	16:55
60	06:30	07:23	08:14	15:17	16:08	17:02
58	06:24	07:14	08:01	15:30	16:17	17:07
56	06:20	07:06	07:50	15:42	16:25	17:12
54	06:15	06:59	07:40	15:52	16:32	17:16
52	06:11	06:53	07:31	16:00	16:39	17:21
50	06:07	06:47	07:23	16:08	16:45	17:25
45	05:58	06:34	07:06	16:25	16:58	17:34
40	05:50	06:23	06:53	16:39	17:09	17:42
35	05:43	06:14	06:41	16:51	17:18	17:49
30	05:36	06:05	06:30	17:01	17:27	17:56
20	05:22	05:49	06:13	17:19	17:43	18:09
10	05:09	05:35	05:57	17:35	17:57	18:23
0	04:55	05:20	05:42	17:50	18:12	18:37
-10	04:39	05:05	05:28	18:05	18:27	18:53
-20	04:19	04:48	05:12	18:21	18:45	19:13
-30	03:55	04:27	04:53	18:39	19:06	19:38
-35	03:39	04:14	04:42	18:50	19:19	19:54
-40	03:20	03:59	04:30	19:03	19:34	20:13
-45	02:55	03:40	04:15	19:18	19:53	20:38
-50	02:21	03:16	03:57	19:36	20:17	21:12
-52	02:03	03:04	03:48	19:45	20:29	21:31
-54	01:40	02:51	03:38	19:55	20:42	21:54
-56	01:08	02:35	03:27	20:06	20:59	22:28
-58	–:–	02:16	03:15	20:19	21:18	–:–
-60	–:–	01:51	02:60	20:34	21:43	–:–

	Moonrise			Moonset		
Lat.	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	00:51	03:01	15:13	14:52	14:31
70	–:–	00:59	03:00	15:03	14:49	14:36
68	–:–	01:05	02:59	14:54	14:47	14:40
66	–:–	01:11	02:58	14:46	14:45	14:43
64	–:–	01:15	02:58	14:40	14:43	14:46
62	–:–	01:19	02:57	14:35	14:42	14:48
60	–:–	01:22	02:57	14:30	14:40	14:50
58	–:–	01:25	02:56	14:26	14:39	14:52
56	00:00	01:28	02:56	14:22	14:38	14:54
54	00:06	01:30	02:56	14:19	14:37	14:55
52	00:10	01:33	02:55	14:15	14:36	14:57
50	00:14	01:35	02:55	14:13	14:36	14:58
45	00:23	01:39	02:54	14:06	14:34	15:01
40	00:31	01:42	02:54	14:01	14:33	15:03
35	00:37	01:45	02:53	13:57	14:31	15:05
30	00:43	01:48	02:53	13:53	14:30	15:07
20	00:53	01:53	02:52	13:46	14:28	15:10
10	01:01	01:57	02:52	13:39	14:26	15:13
0	01:09	02:01	02:52	13:34	14:25	15:16
-10	01:17	02:04	02:51	13:28	14:23	15:18
-20	01:25	02:08	02:51	13:21	14:21	15:21
-30	01:35	02:13	02:50	13:14	14:19	15:24
-35	01:40	02:16	02:50	13:10	14:18	15:26
-40	01:47	02:19	02:50	13:05	14:16	15:28
-45	01:54	02:22	02:49	12:59	14:15	15:30
-50	02:02	02:26	02:49	12:52	14:13	15:33
-52	02:06	02:28	02:49	12:49	14:12	15:35
-54	02:11	02:30	02:48	12:46	14:11	15:36
-56	02:15	02:32	02:48	12:42	14:10	15:38
-58	02:21	02:35	02:48	12:37	14:08	15:39
-60	02:27	02:38	02:48	12:33	14:07	15:41

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	14:22	14:14	11:45	07:21	19:47	24(32%)
22	14:07	13:59	11:46	08:12	20:38	25(22%)
23	13:51	13:43	11:46	09:03	21:29	26(13%)

November 24, 25 ,26 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	62°39.8	155°25.1	-24°38.9	211°33.5	-11°53.9	154°45.6	-23°16.3	133°55.3	-22°13.1
1	77°42.2	170°24.1	-24°39.0	226°34.3	-11°54.4	169°47.5	-23°16.3	148°57.5	-22°13.0
2	92°44.7	185°23.2	-24°39.2	241°35.2	-11°55.0	184°49.3	-23°16.3	163°59.8	-22°13.0
3	107°47.1	200°22.2	-24°39.3	256°36.1	-11°55.6	199°51.2	-23°16.3	179°02.0	-22°13.0
4	122°49.6	215°21.3	-24°39.5	271°37.0	-11°56.2	214°53.1	-23°16.3	194°04.2	-22°13.0
5	137°52.1	230°20.3	-24°39.6	286°37.9	-11°56.7	229°55.0	-23°16.3	209°06.4	-22°12.9
6	152°54.5	245°19.4	-24°39.8	301°38.8	-11°57.3	244°56.8	-23°16.4	224°08.6	-22°12.9
7	167°57.0	260°18.5	-24°39.9	316°39.7	-11°57.9	259°58.7	-23°16.4	239°10.8	-22°12.9
8	182°59.5	275°17.5	-24°40.0	331°40.5	-11°58.5	275°00.6	-23°16.4	254°13.0	-22°12.8
9	198°01.9	290°16.6	-24°40.2	346°41.4	-11°59.1	290°02.5	-23°16.4	269°15.2	-22°12.8
10	213°04.4	305°15.6	-24°40.3	1°42.3	-11°59.6	305°04.3	-23°16.4	284°17.5	-22°12.8
11	228°06.9	320°14.7	-24°40.4	16°43.2	-12°00.2	320°06.2	-23°16.4	299°19.7	-22°12.8
12	243°09.3	335°13.7	-24°40.6	31°44.1	-12°00.8	335°08.1	-23°16.4	314°21.9	-22°12.7
13	258°11.8	350°12.8	-24°40.7	46°45.0	-12°01.4	350°09.9	-23°16.4	329°24.1	-22°12.7
14	273°14.2	5°11.8	-24°40.8	61°45.9	-12°01.9	5°11.8	-23°16.4	344°26.3	-22°12.7
15	288°16.7	20°10.9	-24°41.0	76°46.7	-12°02.5	20°13.7	-23°16.5	359°28.5	-22°12.7
16	303°19.2	35°09.9	-24°41.1	91°47.6	-12°03.1	35°15.6	-23°16.5	14°30.7	-22°12.6
17	318°21.6	50°09.0	-24°41.2	106°48.5	-12°03.7	50°17.4	-23°16.5	29°32.9	-22°12.6
18	333°24.1	65°08.1	-24°41.3	121°49.4	-12°04.2	65°19.3	-23°16.5	44°35.1	-22°12.6
19	348°26.6	80°07.1	-24°41.5	136°50.3	-12°04.8	80°21.2	-23°16.5	59°37.3	-22°12.5
20	3°29.0	95°06.2	-24°41.6	151°51.2	-12°05.4	95°23.1	-23°16.5	74°39.6	-22°12.5
21	18°31.5	110°05.2	-24°41.7	166°52.0	-12°06.0	110°24.9	-23°16.5	89°41.8	-22°12.5
22	33°34.0	125°04.3	-24°41.8	181°52.9	-12°06.5	125°26.8	-23°16.5	104°44.0	-22°12.5
23	48°36.4	140°03.3	-24°41.9	196°53.8	-12°07.1	140°28.7	-23°16.6	119°46.2	-22°12.4
Mer.pass.:19:46		v-0.9 d-0.1 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Mon	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	63°38.9	155°02.4	-24°42.1	211°54.7	-12°07.7	155°30.6	-23°16.6	134°48.4	-22°12.4
1	78°41.4	170°01.4	-24°42.2	226°55.6	-12°08.3	170°32.4	-23°16.6	149°50.6	-22°12.4
2	93°43.8	185°00.5	-24°42.3	241°56.5	-12°08.8	185°34.3	-23°16.6	164°52.8	-22°12.4
3	108°46.3	199°59.5	-24°42.4	256°57.3	-12°09.4	200°36.2	-23°16.6	179°55.0	-22°12.3
4	123°48.7	214°58.6	-24°42.5	271°58.2	-12°10.0	215°38.0	-23°16.6	194°57.2	-22°12.3
5	138°51.2	229°57.6	-24°42.6	286°59.1	-12°10.6	230°39.9	-23°16.6	209°59.4	-22°12.3
6	153°53.7	244°56.7	-24°42.7	301°60.0	-12°11.1	245°41.8	-23°16.6	225°01.7	-22°12.3
7	168°56.1	259°55.8	-24°42.8	317°00.9	-12°11.7	260°43.7	-23°16.6	240°03.9	-22°12.2
8	183°58.6	274°54.8	-24°43.0	332°01.8	-12°12.3	275°45.5	-23°16.7	255°06.1	-22°12.2
9	199°01.1	289°53.9	-24°43.1	347°02.6	-12°12.9	290°47.4	-23°16.7	270°08.3	-22°12.2
10	214°03.5	304°52.9	-24°43.2	2°03.5	-12°13.4	305°49.3	-23°16.7	285°10.5	-22°12.1
11	229°06.0	319°52.0	-24°43.3	17°04.4	-12°14.0	320°51.1	-23°16.7	300°12.7	-22°12.1
12	244°08.5	334°51.0	-24°43.4	32°05.3	-12°14.6	335°53.0	-23°16.7	315°14.9	-22°12.1
13	259°10.9	349°50.1	-24°43.5	47°06.2	-12°15.2	350°54.9	-23°16.7	330°17.1	-22°12.1
14	274°13.4	4°49.1	-24°43.6	62°07.0	-12°15.7	5°56.8	-23°16.7	345°19.3	-22°12.0
15	289°15.9	19°48.2	-24°43.7	77°07.9	-12°16.3	20°58.6	-23°16.7	0°21.5	-22°12.0
16	304°18.3	34°47.2	-24°43.8	92°08.8	-12°16.9	36°00.5	-23°16.7	15°23.7	-22°12.0
17	319°20.8	49°46.3	-24°43.9	107°09.7	-12°17.4	51°02.4	-23°16.8	30°25.9	-22°11.9
18	334°23.2	64°45.3	-24°43.9	122°10.6	-12°18.0	66°04.2	-23°16.8	45°28.2	-22°11.9
19	349°25.7	79°44.4	-24°44.0	137°11.4	-12°18.6	81°06.1	-23°16.8	60°30.4	-22°11.9
20	4°28.2	94°43.4	-24°44.1	152°12.3	-12°19.2	96°08.0	-23°16.8	75°32.6	-22°11.9
21	19°30.6	109°42.5	-24°44.2	167°13.2	-12°19.7	111°09.9	-23°16.8	90°34.8	-22°11.8
22	34°33.1	124°41.5	-24°44.3	182°14.1	-12°20.3	126°11.7	-23°16.8	105°37.0	-22°11.8
23	49°35.6	139°40.6	-24°44.4	197°15.0	-12°20.9	141°13.6	-23°16.8	120°39.2	-22°11.8
Mer.pass.:19:42		v-0.9 d-0.1 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	64°38.0	154°39.6	-24°44.5	212°15.8	-12°21.4	156°15.5	-23°16.8	135°41.4	-22°11.8
1	79°40.5	169°38.7	-24°44.6	227°16.7	-12°22.0	171°17.3	-23°16.8	150°43.6	-22°11.7
2	94°43.0	184°37.7	-24°44.6	242°17.6	-12°22.6	186°19.2	-23°16.8	165°45.8	-22°11.7
3	109°45.4	199°36.8	-24°44.7	257°18.5	-12°23.2	201°21.1	-23°16.9	180°48.0	-22°11.7
4	124°47.9	214°35.8	-24°44.8	272°19.4	-12°23.7	216°22.9	-23°16.9	195°50.2	-22°11.6
5	139°50.4	229°34.9	-24°44.9	287°20.2	-12°24.3	231°24.8	-23°16.9	210°52.4	-22°11.6
6	154°52.8	244°34.0	-24°45.0	302°21.1	-12°24.9	246°26.7	-23°16.9	225°54.6	-22°11.6
7	169°55.3	259°33.0	-24°45.0	317°22.0	-12°25.4	261°28.6	-23°16.9	240°56.9	-22°11.6
8	184°57.7	274°32.1	-24°45.1	332°22.9	-12°26.0	276°30.4	-23°16.9	255°59.1	-22°11.5
9	200°00.2	289°31.1	-24°45.2	347°23.8	-12°26.6	291°32.3	-23°16.9	271°01.3	-22°11.5
10	215°02.7	304°30.2	-24°45.3	2°24.6	-12°27.1	306°34.2	-23°16.9	286°03.5	-22°11.5
11	230°05.1	319°29.2	-24°45.3	17°25.5	-12°27.7	321°36.0	-23°16.9	301°05.7	-22°11.5
12	245°07.6	334°28.3	-24°45.4	32°26.4	-12°28.3	336°37.9	-23°16.9	316°07.9	-22°11.4
13	260°10.1	349°27.3	-24°45.5	47°27.3	-12°28.9	351°39.8	-23°17.0	331°10.1	-22°11.4
14	275°12.5	4°26.4	-24°45.5	62°28.1	-12°29.4	6°41.6	-23°17.0	346°12.3	-22°11.4
15	290°15.0	19°25.4	-24°45.6	77°29.0	-12°30.0	21°43.5	-23°17.0	1°14.5	-22°11.3
16	305°17.5	34°24.5	-24°45.7	92°29.9	-12°30.6	36°45.4	-23°17.0	16°16.7	-22°11.3
17	320°19.9	49°23.5	-24°45.7	107°30.8	-12°31.1	51°47.3	-23°17.0	31°18.9	-22°11.3
18	335°22.4	64°22.6	-24°45.8	122°31.6	-12°31.7	66°49.1	-23°17.0	46°21.1	-22°11.3
19	350°24.8	79°21.6	-24°45.9	137°32.5	-12°32.3	81°51.0	-23°17.0	61°23.3	-22°11.2
20	5°27.3	94°20.7	-24°45.9	152°33.4	-12°32.8	96°52.9	-23°17.0	76°25.5	-22°11.2
21	20°29.8	109°19.7	-24°46.0	167°34.3	-12°33.4	111°54.7	-23°17.0	91°27.7	-22°11.2
22	35°32.2	124°18.8	-24°46.0	182°35.2	-12°34.0	126°56.6	-23°17.0	106°29.9	-22°11.1
23	50°34.7	139°17.8	-24°46.1	197°36.0	-12°34.5	141°58.5	-23°17.1	121°32.1	-22°11.1
Mer.pass.:19:38		v-0.9 d-0.1 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars	**SHA**	**Dec**
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.1
Schedar	349°35.2	56°38.9
Diphda	348°51.2	-17°52.8
Achernar	335°23.0	-57°08.4
Hamal	327°55.5	23°33.4
Polaris	315°24.2	89°20.9
Akamar	315°14.6	-40°13.7
Menkar	314°10.1	4°10.0
Mirfak	308°33.6	49°55.8
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.5	46°01.0
Bellatrix	278°27.0	6°22.0
Elnath	278°06.7	28°37.3
Alnilam	275°41.6	-1°11.4
Betelgeuse	270°56.2	7°24.6
Canopus	263°53.7	-52°42.3
Sirius	258°29.5	-16°44.4
Adara	255°08.8	-28°59.9
Procyon	244°54.8	5°10.6
Pollux	243°22.0	27°58.6
Avior	234°16.0	-59°34.1
Suhail	222°49.1	-43°30.5
Miaplacidus	221°38.6	-69°47.6
Alphard	217°51.7	-8°44.6
Regulus	207°38.8	11°52.2
Dubhe	193°46.4	61°38.5
Denebola	182°29.2	14°27.8
Gienah	175°47.9	-17°38.9
Acrux	173°04.8	-63°12.1
Gacrux	171°56.4	-57°13.1
Alioth	166°17.2	55°51.1
Spica	158°26.9	-11°15.6
Alcaid	152°55.8	49°12.9
Hadar	148°42.2	-60°27.8
Menkent	148°02.8	-36°27.7
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.4	-60°54.7
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.5
Alphecca	126°07.7	26°39.1
Antares	112°21.2	-26°28.3
Atria	107°19.7	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.4	-37°06.9
Rasalhague	96°02.7	12°33.0
Etamin	90°44.6	51°29.4
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.3
Altair	62°04.2	8°55.4
Peacock	53°12.6	-56°40.4
Deneb	49°28.7	45°21.3
Enif	33°42.9	9°58.1
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/11/	**SHA**	**Mer.pass**
Venus	92°45.3	13:39
Mars	148°53.7	09:53
Jupiter	92°05.8	13:39
Saturn	71°15.6	15:02

2019/11/	**SHA**	**Mer.pass**
Venus	91°23.5	13:41
Mars	148°15.8	09:52
Jupiter	91°51.7	13:36
Saturn	71°09.5	14:59

2019/11/	**SHA**	**Mer.pass**
Venus	90°01.6	13:42
Mars	147°37.8	09:50
Jupiter	91°37.4	13:33
Saturn	71°03.4	14:55

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°23.6	-20°26.2	216°23.5	9.9	-5°34.8	-13.8	59.8
1	198°23.4	-20°26.7	230°52.4	9.9	-5°48.7	-13.8	59.7
2	213°23.2	-20°27.2	245°21.2	9.9	-6°02.5	-13.8	59.7
3	228°23.0	-20°27.7	259°50.1	9.8	-6°16.2	-13.7	59.7
4	243°22.9	-20°28.2	274°18.9	9.8	-6°30.0	-13.7	59.7
5	258°22.7	-20°28.7	288°47.7	9.8	-6°43.6	-13.7	59.7
6	273°22.5	-20°29.2	303°16.4	9.8	-6°57.3	-13.6	59.7
7	288°22.3	-20°29.8	317°45.2	9.7	-7°10.9	-13.6	59.7
8	303°22.1	-20°30.3	332°13.9	9.7	-7°24.5	-13.5	59.7
9	318°22.0	-20°30.8	346°42.6	9.7	-7°38.0	-13.5	59.7
10	333°21.8	-20°31.3	1°11.2	9.6	-7°51.4	-13.4	59.7
11	348°21.6	-20°31.8	15°39.9	9.6	-8°04.9	-13.4	59.7
12	3°21.4	-20°32.3	30°08.5	9.6	-8°18.2	-13.3	59.7
13	18°21.2	-20°32.8	44°37.0	9.6	-8°31.6	-13.3	59.7
14	33°21.1	-20°33.3	59°05.6	9.5	-8°44.8	-13.2	59.6
15	48°20.9	-20°33.8	73°34.1	9.5	-8°58.1	-13.2	59.6
16	63°20.7	-20°34.3	88°02.5	9.5	-9°11.2	-13.1	59.6
17	78°20.5	-20°34.8	102°31.0	9.4	-9°24.3	-13.1	59.6
18	93°20.3	-20°35.3	116°59.4	9.4	-9°37.4	-13.0	59.6
19	108°20.1	-20°35.8	131°27.7	9.4	-9°50.4	-13.0	59.6
20	123°20.0	-20°36.3	145°56.1	9.3	-10°03.3	-12.9	59.6
21	138°19.8	-20°36.8	160°24.4	9.3	-10°16.2	-12.8	59.6
22	153°19.6	-20°37.3	174°52.7	9.3	-10°29.0	-12.8	59.6
23	168°19.4	-20°37.8	189°20.9	9.2	-10°41.7	-12.7	59.6
	SD.=16.2	d=-0.5			S.D.=16.3		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°19.2	-20°38.3	203°49.1	9.2	-10°54.4	-12.6	59.5
1	198°19.0	-20°38.8	218°17.3	9.1	-11°07.0	-12.6	59.5
2	213°18.8	-20°39.3	232°45.4	9.1	-11°19.5	-12.5	59.5
3	228°18.7	-20°39.8	247°13.5	9.1	-11°32.0	-12.4	59.5
4	243°18.5	-20°40.3	261°41.5	9.0	-11°44.4	-12.4	59.5
5	258°18.3	-20°40.8	276°09.6	9.0	-11°56.7	-12.3	59.5
6	273°18.1	-20°41.3	290°37.5	9.0	-12°08.9	-12.2	59.5
7	288°17.9	-20°41.8	305°05.5	8.9	-12°21.1	-12.1	59.4
8	303°17.7	-20°42.3	319°33.4	8.9	-12°33.2	-12.0	59.4
9	318°17.5	-20°42.8	334°01.3	8.9	-12°45.2	-12.0	59.4
10	333°17.3	-20°43.3	348°29.1	8.8	-12°57.1	-11.9	59.4
11	348°17.2	-20°43.8	2°56.9	8.8	-13°08.9	-11.8	59.4
12	3°17.0	-20°44.2	17°24.7	8.7	-13°20.7	-11.7	59.4
13	18°16.8	-20°44.7	31°52.4	8.7	-13°32.4	-11.6	59.3
14	33°16.6	-20°45.2	46°20.1	8.7	-13°44.0	-11.5	59.3
15	48°16.4	-20°45.7	60°47.7	8.6	-13°55.5	-11.5	59.3
16	63°16.2	-20°46.2	75°15.3	8.6	-14°06.9	-11.4	59.3
17	78°16.0	-20°46.7	89°42.9	8.5	-14°18.2	-11.3	59.3
18	93°15.8	-20°47.2	104°10.4	8.5	-14°29.5	-11.2	59.3
19	108°15.6	-20°47.7	118°37.9	8.5	-14°40.6	-11.1	59.2
20	123°15.4	-20°48.1	133°05.4	8.4	-14°51.6	-11.0	59.2
21	138°15.2	-20°48.6	147°32.8	8.4	-15°02.6	-10.9	59.2
22	153°15.1	-20°49.1	162°00.2	8.4	-15°13.5	-10.8	59.2
23	168°14.9	-20°49.6	176°27.5	8.3	-15°24.2	-10.7	59.2
	SD.=16.2	d=-0.5			S.D.=16.2		

Tue	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°14.7	-20°50.1	190°54.8	8.3	-15°34.9	-10.6	59.1
1	198°14.5	-20°50.6	205°22.1	8.2	-15°45.4	-10.5	59.1
2	213°14.3	-20°51.0	219°49.3	8.2	-15°55.9	-10.4	59.1
3	228°14.1	-20°51.5	234°16.5	8.2	-16°06.3	-10.3	59.1
4	243°13.9	-20°52.0	248°43.6	8.1	-16°16.5	-10.2	59.1
5	258°13.7	-20°52.5	263°10.8	8.1	-16°26.7	-10.1	59.0
6	273°13.5	-20°53.0	277°37.8	8.1	-16°36.7	-10.0	59.0
7	288°13.3	-20°53.4	292°04.9	8.0	-16°46.6	-9.9	59.0
8	303°13.1	-20°53.9	306°31.9	8.0	-16°56.5	-9.8	59.0
9	318°12.9	-20°54.4	320°58.9	8.0	-17°06.2	-9.7	58.9
10	333°12.7	-20°54.9	335°25.8	7.9	-17°15.8	-9.6	58.9
11	348°12.5	-20°55.3	349°52.7	7.9	-17°25.3	-9.4	58.9
12	3°12.3	-20°55.8	4°19.6	7.9	-17°34.7	-9.3	58.9
13	18°12.1	-20°56.3	18°46.5	7.8	-17°44.0	-9.2	58.9
14	33°11.9	-20°56.8	33°13.3	7.8	-17°53.1	-9.1	58.8
15	48°11.7	-20°57.2	47°40.1	7.8	-18°02.2	-9.0	58.8
16	63°11.5	-20°57.7	62°06.8	7.7	-18°11.1	-8.9	58.8
17	78°11.3	-20°58.2	76°33.5	7.7	-18°19.9	-8.8	58.8
18	93°11.1	-20°58.6	91°00.2	7.7	-18°28.6	-8.6	58.7
19	108°10.9	-20°59.1	105°26.9	7.6	-18°37.2	-8.5	58.7
20	123°10.7	-20°59.6	119°53.5	7.6	-18°45.6	-8.4	58.7
21	138°10.5	-21°00.0	134°20.1	7.6	-18°53.9	-8.3	58.7
22	153°10.3	-21°00.5	148°46.7	7.6	-19°02.1	-8.1	58.6
23	168°10.1	-21°01.0	163°13.2	7.5	-19°10.2	-8.0	58.6
	SD.=16.2	d=-0.5			S.D.=16.1		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:32	09:20	–:–	–:–	14:13	16:01
70	07:18	08:48	11:23	12:10	14:44	16:15
68	07:07	08:25	10:01	13:32	15:08	16:26
66	06:57	08:07	09:24	14:09	15:26	16:36
64	06:49	07:52	08:58	14:35	15:41	16:44
62	06:42	07:40	08:38	14:56	15:53	16:51
60	06:35	07:29	08:21	15:12	16:04	16:58
58	06:29	07:20	08:07	15:26	16:14	17:04
56	06:24	07:11	07:56	15:38	16:22	17:09
54	06:19	07:04	07:45	15:48	16:29	17:14
52	06:15	06:57	07:36	15:57	16:36	17:18
50	06:11	06:51	07:28	16:06	16:42	17:23
45	06:01	06:38	07:10	16:23	16:56	17:32
40	05:53	06:26	06:56	16:38	17:07	17:40
35	05:45	06:16	06:44	16:50	17:17	17:48
30	05:38	06:07	06:33	17:01	17:26	17:56
20	05:24	05:51	06:15	17:19	17:43	18:10
10	05:10	05:36	05:58	17:35	17:58	18:24
0	04:55	05:21	05:43	17:51	18:13	18:38
-10	04:39	05:05	05:28	18:06	18:29	18:55
-20	04:19	04:47	05:11	18:23	18:47	19:15
-30	03:53	04:26	04:52	18:42	19:08	19:41
-35	03:37	04:12	04:41	18:53	19:22	19:57
-40	03:17	03:57	04:28	19:06	19:38	20:17
-45	02:52	03:37	04:13	19:22	19:57	20:43
-50	02:16	03:13	03:54	19:41	20:22	21:19
-52	01:57	03:00	03:45	19:50	20:35	21:39
-54	01:32	02:46	03:34	20:00	20:49	22:05
-56	00:55	02:29	03:23	20:12	21:06	22:43
-58	–:–	02:09	03:10	20:25	21:27	–:–
-60	–:–	01:42	02:54	20:41	21:55	–:–

Lat.	**Moonrise**			**Moonset**		
	Sun	Mon	Tue	Sun	Mon	Tue
72	05:13	07:35	10:46	14:08	13:37	12:21
70	05:03	07:11	09:34	14:21	14:03	13:34
68	04:54	06:52	08:57	14:32	14:24	14:12
66	04:47	06:38	08:31	14:41	14:40	14:39
64	04:41	06:26	08:11	14:49	14:53	14:60
62	04:36	06:15	07:55	14:55	15:04	15:17
60	04:31	06:07	07:42	15:01	15:14	15:31
58	04:28	05:59	07:30	15:06	15:22	15:43
56	04:24	05:53	07:20	15:11	15:30	15:54
54	04:21	05:47	07:12	15:15	15:36	16:03
52	04:18	05:42	07:04	15:18	15:43	16:11
50	04:16	05:37	06:57	15:22	15:48	16:19
45	04:10	05:26	06:42	15:29	15:60	16:35
40	04:06	05:18	06:30	15:35	16:10	16:48
35	04:02	05:11	06:19	15:41	16:18	16:59
30	03:58	05:04	06:10	15:45	16:26	17:09
20	03:53	04:53	05:55	15:53	16:39	17:26
10	03:48	04:44	05:41	16:01	16:50	17:41
0	03:43	04:35	05:29	16:07	17:01	17:55
-10	03:38	04:26	05:17	16:14	17:11	18:09
-20	03:33	04:17	05:03	16:22	17:23	18:24
-30	03:28	04:07	04:48	16:30	17:36	18:42
-35	03:24	04:01	04:40	16:35	17:43	18:52
-40	03:21	03:54	04:30	16:40	17:52	19:03
-45	03:17	03:46	04:19	16:47	18:02	19:17
-50	03:12	03:36	04:05	16:54	18:15	19:34
-52	03:09	03:32	03:58	16:58	18:21	19:41
-54	03:07	03:27	03:51	17:02	18:27	19:50
-56	03:04	03:22	03:43	17:06	18:34	20:00
-58	03:01	03:16	03:35	17:11	18:42	20:11
-60	02:58	03:10	03:25	17:16	18:51	20:25

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	13:34	13:26	11:46	09:55	22:21	27(6%)
25	13:17	13:08	11:46	10:47	23:14	28(2%)
26	12:59	12:49	11:47	11:42	00:09	29(0%)

November 27, 28 ,29 (Wed., Thu., Fri.)

	Aries	Venus		Mars		Jupiter		Saturn	
Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	65°37.2	154°16.9	-24°46.1	212°36.9	-12°35.1	157°00.3	-23°17.1	136°34.3	-22°11.1
1	80°39.6	169°15.9	-24°46.2	227°37.8	-12°35.7	172°02.2	-23°17.1	151°36.6	-22°11.1
2	95°42.1	184°15.0	-24°46.2	242°38.7	-12°36.2	187°04.1	-23°17.1	166°38.8	-22°11.0
3	110°44.6	199°14.0	-24°46.3	257°39.5	-12°36.8	202°05.9	-23°17.1	181°41.0	-22°11.0
4	125°47.0	214°13.1	-24°46.3	272°40.4	-12°37.4	217°07.8	-23°17.1	196°43.2	-22°11.0
5	140°49.5	229°12.1	-24°46.4	287°41.3	-12°38.0	232°09.7	-23°17.1	211°45.4	-22°10.9
6	155°52.0	244°11.2	-24°46.4	302°42.2	-12°38.5	247°11.5	-23°17.1	226°47.6	-22°10.9
7	170°54.4	259°10.2	-24°46.5	317°43.0	-12°39.1	262°13.4	-23°17.1	241°49.8	-22°10.9
8	185°56.9	274°09.3	-24°46.5	332°43.9	-12°39.7	277°15.3	-23°17.1	256°52.0	-22°10.9
9	200°59.3	289°08.3	-24°46.6	347°44.8	-12°40.2	292°17.1	-23°17.1	271°54.2	-22°10.8
10	216°01.8	304°07.4	-24°46.6	2°45.7	-12°40.8	307°19.0	-23°17.2	286°56.4	-22°10.8
11	231°04.3	319°06.4	-24°46.7	17°46.5	-12°41.4	322°20.9	-23°17.2	301°58.6	-22°10.8
12	246°06.7	334°05.5	-24°46.7	32°47.4	-12°41.9	337°22.7	-23°17.2	317°00.8	-22°10.7
13	261°09.2	349°04.5	-24°46.7	47°48.3	-12°42.5	352°24.6	-23°17.2	332°03.0	-22°10.7
14	276°11.7	4°03.6	-24°46.8	62°49.1	-12°43.0	7°26.5	-23°17.2	347°05.2	-22°10.7
15	291°14.1	19°02.6	-24°46.8	77°50.0	-12°43.6	22°28.4	-23°17.2	2°07.4	-22°10.7
16	306°16.6	34°01.7	-24°46.8	92°50.9	-12°44.2	37°30.2	-23°17.2	17°09.6	-22°10.6
17	321°19.1	49°00.7	-24°46.9	107°51.8	-12°44.7	52°32.1	-23°17.2	32°11.8	-22°10.6
18	336°21.5	63°59.8	-24°46.9	122°52.6	-12°45.3	67°34.0	-23°17.2	47°14.0	-22°10.6
19	351°24.0	78°58.8	-24°46.9	137°53.5	-12°45.9	82°35.8	-23°17.2	62°16.2	-22°10.5
20	6°26.5	93°57.9	-24°47.0	152°54.4	-12°46.4	97°37.7	-23°17.2	77°18.4	-22°10.5
21	21°28.9	108°56.9	-24°47.0	167°55.3	-12°47.0	112°39.6	-23°17.3	92°20.6	-22°10.5
22	36°31.4	123°56.0	-24°47.0	182°56.1	-12°47.6	127°41.4	-23°17.3	107°22.8	-22°10.5
23	51°33.8	138°55.0	-24°47.0	197°57.0	-12°48.1	142°43.3	-23°17.3	122°25.0	-22°10.4
Mer.pass.:19:34		v-0.9 d-0.1 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Thu	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	66°36.3	153°54.1	-24°47.1	212°57.9	-12°48.7	157°45.2	-23°17.3	137°27.2	-22°10.4
1	81°38.8	168°53.1	-24°47.1	227°58.8	-12°49.3	172°47.0	-23°17.3	152°29.4	-22°10.4
2	96°41.2	183°52.2	-24°47.1	242°59.6	-12°49.8	187°48.9	-23°17.3	167°31.6	-22°10.3
3	111°43.7	198°51.2	-24°47.1	258°00.5	-12°50.4	202°50.8	-23°17.3	182°33.8	-22°10.3
4	126°46.2	213°50.3	-24°47.1	273°01.4	-12°51.0	217°52.6	-23°17.3	197°36.0	-22°10.3
5	141°48.6	228°49.3	-24°47.1	288°02.2	-12°51.5	232°54.5	-23°17.3	212°38.2	-22°10.3
6	156°51.1	243°48.4	-24°47.2	303°03.1	-12°52.1	247°56.3	-23°17.3	227°40.4	-22°10.2
7	171°53.6	258°47.4	-24°47.2	318°04.0	-12°52.6	262°58.2	-23°17.3	242°42.6	-22°10.2
8	186°56.0	273°46.5	-24°47.2	333°04.9	-12°53.2	278°00.1	-23°17.4	257°44.9	-22°10.2
9	201°58.5	288°45.5	-24°47.2	348°05.7	-12°53.8	293°01.9	-23°17.4	272°47.1	-22°10.1
10	217°01.0	303°44.6	-24°47.2	3°06.6	-12°54.3	308°03.8	-23°17.4	287°49.3	-22°10.1
11	232°03.4	318°43.6	-24°47.2	18°07.5	-12°54.9	323°05.7	-23°17.4	302°51.5	-22°10.1
12	247°05.9	333°42.7	-24°47.2	33°08.3	-12°55.5	338°07.5	-23°17.4	317°53.7	-22°10.1
13	262°08.3	348°41.7	-24°47.2	48°09.2	-12°56.0	353°09.4	-23°17.4	332°55.9	-22°10.0
14	277°10.8	3°40.8	-24°47.2	63°10.1	-12°56.6	8°11.3	-23°17.4	347°58.1	-22°10.0
15	292°13.3	18°39.8	-24°47.2	78°10.9	-12°57.1	23°13.1	-23°17.4	3°00.3	-22°10.0
16	307°15.7	33°38.9	-24°47.2	93°11.8	-12°57.7	38°15.0	-23°17.4	18°02.5	-22°09.9
17	322°18.2	48°37.9	-24°47.2	108°12.7	-12°58.3	53°16.9	-23°17.4	33°04.7	-22°09.9
18	337°20.7	63°37.0	-24°47.2	123°13.6	-12°58.8	68°18.7	-23°17.4	48°06.9	-22°09.9
19	352°23.1	78°36.0	-24°47.2	138°14.4	-12°59.4	83°20.6	-23°17.4	63°09.1	-22°09.9
20	7°25.6	93°35.1	-24°47.2	153°15.3	-12°60.0	98°22.5	-23°17.5	78°11.3	-22°09.8
21	22°28.1	108°34.1	-24°47.2	168°16.2	-13°00.5	113°24.3	-23°17.5	93°13.5	-22°09.8
22	37°30.5	123°33.2	-24°47.2	183°17.0	-13°01.1	128°26.2	-23°17.5	108°15.7	-22°09.8
23	52°33.0	138°32.3	-24°47.2	198°17.9	-13°01.6	143°28.1	-23°17.5	123°17.9	-22°09.7
Mer.pass.:19:30		v-0.9 d-0.0 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Fri	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	67°35.5	153°31.3	-24°47.2	213°18.8	-13°02.2	158°29.9	-23°17.5	138°20.1	-22°09.7
1	82°37.9	168°30.4	-24°47.2	228°19.6	-13°02.8	173°31.8	-23°17.5	153°22.3	-22°09.7
2	97°40.4	183°29.4	-24°47.2	243°20.5	-13°03.3	188°33.7	-23°17.5	168°24.5	-22°09.7
3	112°42.8	198°28.5	-24°47.2	258°21.4	-13°03.9	203°35.5	-23°17.5	183°26.7	-22°09.6
4	127°45.3	213°27.5	-24°47.2	273°22.2	-13°04.4	218°37.4	-23°17.5	198°28.9	-22°09.6
5	142°47.8	228°26.6	-24°47.1	288°23.1	-13°05.0	233°39.2	-23°17.5	213°31.1	-22°09.6
6	157°50.2	243°25.6	-24°47.1	303°24.0	-13°05.6	248°41.1	-23°17.5	228°33.3	-22°09.5
7	172°52.7	258°24.7	-24°47.1	318°24.8	-13°06.1	263°43.0	-23°17.5	243°35.5	-22°09.5
8	187°55.2	273°23.7	-24°47.1	333°25.7	-13°06.7	278°44.8	-23°17.5	258°37.7	-22°09.5
9	202°57.6	288°22.8	-24°47.1	348°26.6	-13°07.2	293°46.7	-23°17.6	273°39.9	-22°09.5
10	218°00.1	303°21.8	-24°47.1	3°27.4	-13°07.8	308°48.6	-23°17.6	288°42.1	-22°09.4
11	233°02.6	318°20.9	-24°47.0	18°28.3	-13°08.4	323°50.4	-23°17.6	303°44.3	-22°09.4
12	248°05.0	333°19.9	-24°47.0	33°29.2	-13°08.9	338°52.3	-23°17.6	318°46.5	-22°09.4
13	263°07.5	348°19.0	-24°47.0	48°30.0	-13°09.5	353°54.2	-23°17.6	333°48.7	-22°09.3
14	278°10.0	3°18.0	-24°47.0	63°30.9	-13°10.0	8°56.0	-23°17.6	348°50.9	-22°09.3
15	293°12.4	18°17.1	-24°46.9	78°31.8	-13°10.6	23°57.9	-23°17.6	3°53.1	-22°09.3
16	308°14.9	33°16.1	-24°46.9	93°32.6	-13°11.1	38°59.7	-23°17.6	18°55.3	-22°09.2
17	323°17.3	48°15.2	-24°46.9	108°33.5	-13°11.7	54°01.6	-23°17.6	33°57.5	-22°09.2
18	338°19.8	63°14.2	-24°46.8	123°34.4	-13°12.3	69°03.5	-23°17.6	48°59.7	-22°09.2
19	353°22.3	78°13.3	-24°46.8	138°35.2	-13°12.8	84°05.3	-23°17.6	64°01.9	-22°09.2
20	8°24.7	93°12.3	-24°46.8	153°36.1	-13°13.4	99°07.2	-23°17.6	79°04.1	-22°09.1
21	23°27.2	108°11.4	-24°46.7	168°37.0	-13°13.9	114°09.1	-23°17.6	94°06.2	-22°09.1
22	38°29.7	123°10.4	-24°46.7	183°37.8	-13°14.5	129°10.9	-23°17.6	109°08.4	-22°09.1
23	53°32.1	138°09.5	-24°46.7	198°38.7	-13°15.1	144°12.8	-23°17.7	124°10.6	-22°09.0
Mer.pass.:19:26		v-0.9 d0.0 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.2
Schedar	349°35.2	56°38.9
Diphda	348°51.2	-17°52.8
Achernar	335°23.0	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°24.3	89°20.9
Akamar	315°14.6	-40°13.7
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.8
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.5	46°01.0
Bellatrix	278°27.0	6°22.0
Elnath	278°06.7	28°37.3
Alnilam	275°41.6	-1°11.4
Betelgeuse	270°56.2	7°24.5
Canopus	263°53.7	-52°42.3
Sirius	258°29.5	-16°44.4
Adara	255°08.8	-28°59.9
Procyon	244°54.8	5°10.6
Pollux	243°22.0	27°58.6
Avior	234°15.9	-59°34.1
Suhail	222°49.1	-43°30.5
Miaplacidus	221°38.5	-69°47.6
Alphard	217°51.7	-8°44.6
Regulus	207°38.8	11°52.2
Dubhe	193°46.4	61°38.4
Denebola	182°29.2	14°27.7
Gienah	175°47.9	-17°38.9
Acrux	173°04.8	-63°12.1
Gacrux	171°56.3	-57°13.1
Alioth	166°17.2	55°51.0
Spica	158°26.8	-11°15.6
Alcaid	152°55.8	49°12.9
Hadar	148°42.2	-60°27.8
Menkent	148°02.7	-36°27.7
Arcturus	145°51.9	19°05.2
Rigil Kent.	139°46.4	-60°54.7
Zubenelg.	137°00.9	-16°07.2
Kochab	137°21.2	74°04.4
Alphecca	126°07.7	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.6	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°33.0
Etamin	90°44.6	51°29.4
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.2
Altair	62°04.2	8°55.3
Peacock	53°12.6	-56°40.4
Deneb	49°28.7	45°21.3
Enif	33°42.9	9°58.1
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/11/	SHA	Mer.pass
Venus	88°39.7	13:44
Mars	146°59.7	09:49
Jupiter	91°23.2	13:30
Saturn	70°57.2	14:52

2019/11/	SHA	Mer.pass
Venus	87°17.8	13:45
Mars	146°21.6	09:48
Jupiter	91°08.8	13:27
Saturn	70°50.9	14:48

2019/11/	SHA	Mer.pass
Venus	85°55.8	13:47
Mars	145°43.3	09:46
Jupiter	90°54.5	13:24
Saturn	70°44.6	14:45

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°09.9	-21°01.4	177°39.8	7.5	-19°18.2	-7.9	58.6
1	198°09.7	-21°01.9	192°06.3	7.5	-19°26.0	-7.8	58.5
2	213°09.5	-21°02.4	206°32.7	7.5	-19°33.8	-7.7	58.5
3	228°09.3	-21°02.8	220°59.2	7.4	-19°41.3	-7.5	58.5
4	243°09.1	-21°03.3	235°25.6	7.4	-19°48.8	-7.4	58.5
5	258°08.9	-21°03.8	249°52.0	7.4	-19°56.1	-7.3	58.4
6	273°08.7	-21°04.2	264°18.4	7.4	-20°03.3	-7.1	58.4
7	288°08.5	-21°04.7	278°44.8	7.4	-20°10.4	-7.0	58.4
8	303°08.3	-21°05.1	293°11.1	7.3	-20°17.4	-6.9	58.4
9	318°08.1	-21°05.6	307°37.4	7.3	-20°24.2	-6.8	58.3
10	333°07.9	-21°06.1	322°03.8	7.3	-20°30.9	-6.6	58.3
11	348°07.7	-21°06.5	336°30.1	7.3	-20°37.4	-6.5	58.3
12	3°07.5	-21°07.0	350°56.3	7.3	-20°43.9	-6.4	58.2
13	18°07.3	-21°07.4	5°22.6	7.3	-20°50.2	-6.2	58.2
14	33°07.1	-21°07.9	19°48.9	7.2	-20°56.3	-6.1	58.2
15	48°06.9	-21°08.3	34°15.1	7.2	-21°02.3	-6.0	58.2
16	63°06.7	-21°08.8	48°41.3	7.2	-21°08.2	-5.8	58.1
17	78°06.5	-21°09.3	63°07.6	7.2	-21°14.0	-5.7	58.1
18	93°06.3	-21°09.7	77°33.8	7.2	-21°19.6	-5.6	58.1
19	108°06.1	-21°10.2	91°60.0	7.2	-21°25.1	-5.4	58.0
20	123°05.9	-21°10.6	106°26.2	7.2	-21°30.5	-5.3	58.0
21	138°05.7	-21°11.1	120°52.4	7.2	-21°35.7	-5.1	58.0
22	153°05.4	-21°11.5	135°18.6	7.2	-21°40.8	-5.0	58.0
23	168°05.2	-21°12.0	149°44.7	7.2	-21°45.7	-4.9	57.9
	SD.=16.2	d=-0.5			S.D.=16.0		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	183°05.0	-21°12.4	164°10.9	7.2	-21°50.5	-4.7	57.9
1	198°04.8	-21°12.9	178°37.1	7.2	-21°55.2	-4.6	57.9
2	213°04.6	-21°13.3	193°03.3	7.2	-21°59.7	-4.5	57.8
3	228°04.4	-21°13.8	207°29.5	7.2	-22°04.1	-4.3	57.8
4	243°04.2	-21°14.2	221°55.7	7.2	-22°08.4	-4.2	57.8
5	258°04.0	-21°14.7	236°21.9	7.2	-22°12.5	-4.1	57.7
6	273°03.8	-21°15.1	250°48.1	7.2	-22°16.5	-3.9	57.7
7	288°03.6	-21°15.5	265°14.3	7.2	-22°20.3	-3.8	57.7
8	303°03.4	-21°16.0	279°40.5	7.2	-22°24.0	-3.6	57.6
9	318°03.1	-21°16.4	294°06.7	7.2	-22°27.6	-3.5	57.6
10	333°02.9	-21°16.9	308°33.0	7.2	-22°31.0	-3.4	57.6
11	348°02.7	-21°17.3	322°59.2	7.3	-22°34.3	-3.2	57.6
12	3°02.5	-21°17.8	337°25.5	7.3	-22°37.5	-3.1	57.5
13	18°02.3	-21°18.2	351°51.8	7.3	-22°40.5	-2.9	57.5
14	33°02.1	-21°18.6	6°18.1	7.3	-22°43.3	-2.8	57.5
15	48°01.9	-21°19.1	20°44.4	7.3	-22°46.1	-2.7	57.4
16	63°01.7	-21°19.5	35°10.7	7.3	-22°48.7	-2.5	57.4
17	78°01.4	-21°20.0	49°37.1	7.4	-22°51.1	-2.4	57.4
18	93°01.2	-21°20.4	64°03.4	7.4	-22°53.5	-2.3	57.3
19	108°01.0	-21°20.8	78°29.8	7.4	-22°55.6	-2.1	57.3
20	123°00.8	-21°21.3	92°56.2	7.4	-22°57.7	-2.0	57.3
21	138°00.6	-21°21.7	107°22.7	7.5	-22°59.6	-1.8	57.2
22	153°00.4	-21°22.1	121°49.2	7.5	-23°01.4	-1.7	57.2
23	168°00.2	-21°22.6	136°15.7	7.5	-23°03.0	-1.6	57.2
	SD.=16.2	d=-0.4			S.D.=15.8		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°59.9	-21°23.0	150°42.2	7.5	-23°04.5	-1.4	57.1
1	197°59.7	-21°23.4	165°08.7	7.6	-23°05.8	-1.3	57.1
2	212°59.5	-21°23.9	179°35.3	7.6	-23°07.1	-1.2	57.1
3	227°59.3	-21°24.3	194°01.9	7.6	-23°08.1	-1.0	57.0
4	242°59.1	-21°24.7	208°28.6	7.7	-23°09.1	-0.9	57.0
5	257°58.9	-21°25.1	222°55.3	7.7	-23°09.9	-0.7	57.0
6	272°58.6	-21°25.6	237°22.0	7.7	-23°10.6	-0.6	56.9
7	287°58.4	-21°26.0	251°48.8	7.8	-23°11.1	-0.5	56.9
8	302°58.2	-21°26.4	266°15.6	7.8	-23°11.5	-0.3	56.9
9	317°58.0	-21°26.9	280°42.4	7.9	-23°11.8	-0.2	56.9
10	332°57.8	-21°27.3	295°09.3	7.9	-23°12.0	-0.1	56.8
11	347°57.5	-21°27.7	309°36.2	7.9	-23°12.0	0.1	56.8
12	2°57.3	-21°28.1	324°03.2	8.0	-23°11.8	0.2	56.8
13	17°57.1	-21°28.6	338°30.2	8.0	-23°11.6	0.3	56.7
14	32°56.9	-21°29.0	352°57.2	8.1	-23°11.2	0.5	56.7
15	47°56.7	-21°29.4	7°24.3	8.1	-23°10.7	0.6	56.7
16	62°56.4	-21°29.8	21°51.5	8.2	-23°10.0	0.7	56.6
17	77°56.2	-21°30.2	36°18.6	8.2	-23°09.2	0.8	56.6
18	92°56.0	-21°30.7	50°45.9	8.3	-23°08.3	1.0	56.6
19	107°55.8	-21°31.1	65°13.2	8.3	-23°07.3	1.1	56.5
20	122°55.6	-21°31.5	79°40.5	8.4	-23°06.1	1.2	56.5
21	137°55.3	-21°31.9	94°07.9	8.4	-23°04.8	1.4	56.5
22	152°55.1	-21°32.3	108°35.4	8.5	-23°03.4	1.5	56.4
23	167°54.9	-21°32.8	123°02.9	8.5	-23°01.9	1.6	56.4
	SD.=16.2	d=-0.4			S.D.=15.6		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	07:41	09:35	–:–	–:–	14:00	15:53
70	07:26	08:59	–:–	–:–	14:36	16:09
68	07:14	08:34	10:17	13:18	15:01	16:21
66	07:04	08:15	09:35	14:00	15:20	16:31
64	06:55	07:59	09:07	14:28	15:36	16:40
62	06:47	07:46	08:45	14:50	15:49	16:48
60	06:40	07:35	08:28	15:07	16:00	16:55
58	06:34	07:25	08:13	15:22	16:10	17:01
56	06:29	07:16	08:01	15:34	16:19	17:06
54	06:24	07:08	07:50	15:45	16:27	17:12
52	06:19	07:01	07:41	15:55	16:34	17:16
50	06:15	06:55	07:32	16:03	16:40	17:21
45	06:05	06:41	07:14	16:21	16:54	17:31
40	05:56	06:29	06:59	16:36	17:06	17:40
35	05:48	06:19	06:46	16:49	17:17	17:48
30	05:40	06:10	06:35	17:00	17:26	17:55
20	05:26	05:53	06:16	17:19	17:43	18:10
10	05:11	05:37	05:60	17:36	17:58	18:24
0	04:56	05:22	05:44	17:51	18:14	18:40
-10	04:39	05:06	05:28	18:07	18:30	18:57
-20	04:19	04:47	05:11	18:24	18:49	19:17
-30	03:52	04:25	04:52	18:44	19:11	19:44
-35	03:36	04:11	04:40	18:56	19:25	20:00
-40	03:15	03:55	04:27	19:09	19:41	20:21
-45	02:49	03:35	04:11	19:26	20:01	20:48
-50	02:11	03:09	03:51	19:45	20:27	21:26
-52	01:51	02:57	03:42	19:55	20:40	21:47
-54	01:24	02:42	03:31	20:05	20:55	22:15
-56	00:40	02:24	03:19	20:18	21:13	23:02
-58	–:–	02:02	03:05	20:32	21:36	–:–
-60	–:–	01:33	02:49	20:48	22:06	–:–

		Moonrise			**Moonset**	
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	11:14	–:–	–:–	13:51	–:–	–:–
66	10:25	12:13	13:29	14:41	14:51	15:31
64	09:54	11:26	12:33	15:13	15:38	16:26
62	09:31	10:55	12:00	15:36	16:08	16:59
60	09:12	10:33	11:36	15:55	16:32	17:23
58	08:57	10:14	11:17	16:11	16:50	17:42
56	08:44	09:59	11:01	16:25	17:06	17:58
54	08:32	09:45	10:47	16:36	17:19	18:12
52	08:22	09:34	10:35	16:47	17:31	18:24
50	08:14	09:24	10:24	16:56	17:41	18:35
45	07:55	09:02	10:02	17:16	18:03	18:57
40	07:39	08:45	09:44	17:32	18:21	19:15
35	07:27	08:30	09:29	17:45	18:36	19:30
30	07:15	08:18	09:16	17:57	18:48	19:43
20	06:56	07:56	08:53	18:17	19:10	20:05
10	06:40	07:38	08:34	18:35	19:29	20:24
0	06:24	07:20	08:16	18:51	19:47	20:42
-10	06:09	07:03	07:58	19:08	20:05	21:00
-20	05:53	06:45	07:39	19:25	20:24	21:19
-30	05:34	06:24	07:17	19:46	20:46	21:41
-35	05:23	06:11	07:04	19:57	20:59	21:54
-40	05:11	05:57	06:49	20:11	21:14	22:09
-45	04:56	05:40	06:31	20:27	21:31	22:27
-50	04:39	05:20	06:09	20:47	21:53	22:48
-52	04:30	05:10	05:59	20:57	22:04	22:59
-54	04:21	04:59	05:47	21:08	22:15	23:10
-56	04:11	04:46	05:33	21:20	22:29	23:24
-58	03:59	04:32	05:17	21:34	22:45	23:39
-60	03:45	04:15	04:59	21:51	23:03	23:58

		Sun			**Moon**	
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	12:40	12:30	11:47	12:37	00:09	1(1%)
28	12:20	12:10	11:47	13:33	01:05	2(4%)
29	12:00	11:49	11:48	14:29	02:01	3(10%)

November 30, 01 ,02 (Sat., Sun., Mon.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sat	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	68°34.6	153°08.5	-24°46.6	213°39.6	-13°15.6	159°14.6	-23°17.7	139°12.8	-22°09.0
1	83°37.1	168°07.6	-24°46.6	228°40.4	-13°16.2	174°16.5	-23°17.7	154°15.0	-22°09.0
2	98°39.5	183°06.6	-24°46.5	243°41.3	-13°16.7	189°18.4	-23°17.7	169°17.2	-22°09.0
3	113°42.0	198°05.7	-24°46.5	258°42.2	-13°17.3	204°20.2	-23°17.7	184°19.4	-22°08.9
4	128°44.4	213°04.7	-24°46.4	273°43.0	-13°17.8	219°22.1	-23°17.7	199°21.6	-22°08.9
5	143°46.9	228°03.8	-24°46.4	288°43.9	-13°18.4	234°24.0	-23°17.7	214°23.8	-22°08.9
6	158°49.4	243°02.9	-24°46.4	303°44.7	-13°18.9	249°25.8	-23°17.7	229°26.0	-22°08.8
7	173°51.8	258°01.9	-24°46.3	318°45.6	-13°19.5	264°27.7	-23°17.7	244°28.2	-22°08.8
8	188°54.3	273°01.0	-24°46.3	333°46.5	-13°20.1	279°29.5	-23°17.7	259°30.4	-22°08.8
9	203°56.8	288°00.0	-24°46.2	348°47.3	-13°20.6	294°31.4	-23°17.7	274°32.6	-22°08.7
10	218°59.2	302°59.1	-24°46.1	3°48.2	-13°21.2	309°33.3	-23°17.7	289°34.8	-22°08.7
11	234°01.7	317°58.1	-24°46.1	18°49.1	-13°21.7	324°35.1	-23°17.7	304°37.0	-22°08.7
12	249°04.2	332°57.2	-24°46.0	33°49.9	-13°22.3	339°37.0	-23°17.7	319°39.2	-22°08.7
13	264°06.6	347°56.2	-24°46.0	48°50.8	-13°22.8	354°38.9	-23°17.7	334°41.4	-22°08.6
14	279°09.1	2°55.3	-24°45.9	63°51.7	-13°23.4	9°40.7	-23°17.7	349°43.6	-22°08.6
15	294°11.6	17°54.3	-24°45.9	78°52.5	-13°23.9	24°42.6	-23°17.8	4°45.8	-22°08.6
16	309°14.0	32°53.4	-24°45.8	93°53.4	-13°24.5	39°44.4	-23°17.8	19°48.0	-22°08.5
17	324°16.5	47°52.4	-24°45.7	108°54.2	-13°25.1	54°46.3	-23°17.8	34°50.2	-22°08.5
18	339°18.9	62°51.5	-24°45.7	123°55.1	-13°25.6	69°48.2	-23°17.8	49°52.4	-22°08.5
19	354°21.4	77°50.5	-24°45.6	138°56.0	-13°26.2	84°50.0	-23°17.8	64°54.6	-22°08.5
20	9°23.9	92°49.6	-24°45.5	153°56.8	-13°26.7	99°51.9	-23°17.8	79°56.8	-22°08.4
21	24°26.3	107°48.7	-24°45.5	168°57.7	-13°27.3	114°53.7	-23°17.8	94°59.0	-22°08.4
22	39°28.8	122°47.7	-24°45.4	183°58.6	-13°27.8	129°55.6	-23°17.8	110°01.2	-22°08.4
23	54°31.3	137°46.8	-24°45.3	198°59.4	-13°28.4	144°57.5	-23°17.8	125°03.4	-22°08.3
Mer.pass.:19:22		v-0.9 d0.0 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	69°33.7	152°45.8	-24°45.3	214°00.3	-13°28.9	159°59.3	-23°17.8	140°05.6	-22°08.3
1	84°36.2	167°44.9	-24°45.2	229°01.1	-13°29.5	175°01.2	-23°17.8	155°07.8	-22°08.3
2	99°38.7	182°43.9	-24°45.1	244°02.0	-13°30.0	190°03.1	-23°17.8	170°10.0	-22°08.2
3	114°41.1	197°43.0	-24°45.0	259°02.9	-13°30.6	205°04.9	-23°17.8	185°12.2	-22°08.2
4	129°43.6	212°42.0	-24°45.0	274°03.7	-13°31.1	220°06.8	-23°17.8	200°14.3	-22°08.2
5	144°46.1	227°41.1	-24°44.9	289°04.6	-13°31.7	235°08.6	-23°17.8	215°16.5	-22°08.2
6	159°48.5	242°40.1	-24°44.8	304°05.4	-13°32.2	250°10.5	-23°17.8	230°18.7	-22°08.1
7	174°51.0	257°39.2	-24°44.7	319°06.3	-13°32.8	265°12.4	-23°17.9	245°20.9	-22°08.1
8	189°53.4	272°38.3	-24°44.7	334°07.2	-13°33.3	280°14.2	-23°17.9	260°23.1	-22°08.1
9	204°55.9	287°37.3	-24°44.6	349°08.0	-13°33.9	295°16.1	-23°17.9	275°25.3	-22°08.0
10	219°58.4	302°36.4	-24°44.5	4°08.9	-13°34.5	310°17.9	-23°17.9	290°27.5	-22°08.0
11	235°00.8	317°35.4	-24°44.4	19°09.7	-13°35.0	325°19.8	-23°17.9	305°29.7	-22°08.0
12	250°03.3	332°34.5	-24°44.3	34°10.6	-13°35.6	340°21.7	-23°17.9	320°31.9	-22°07.9
13	265°05.8	347°33.5	-24°44.2	49°11.5	-13°36.1	355°23.5	-23°17.9	335°34.1	-22°07.9
14	280°08.2	2°32.6	-24°44.1	64°12.3	-13°36.7	10°25.4	-23°17.9	350°36.3	-22°07.9
15	295°10.7	17°31.6	-24°44.0	79°13.2	-13°37.2	25°27.2	-23°17.9	5°38.5	-22°07.8
16	310°13.2	32°30.7	-24°44.0	94°14.0	-13°37.8	40°29.1	-23°17.9	20°40.7	-22°07.8
17	325°15.6	47°29.8	-24°43.9	109°14.9	-13°38.3	55°31.0	-23°17.9	35°42.9	-22°07.8
18	340°18.1	62°28.8	-24°43.8	124°15.7	-13°38.9	70°32.8	-23°17.9	50°45.1	-22°07.8
19	355°20.6	77°27.9	-24°43.7	139°16.6	-13°39.4	85°34.7	-23°17.9	65°47.3	-22°07.7
20	10°23.0	92°26.9	-24°43.6	154°17.5	-13°40.0	100°36.5	-23°17.9	80°49.5	-22°07.7
21	25°25.5	107°26.0	-24°43.5	169°18.3	-13°40.5	115°38.4	-23°17.9	95°51.7	-22°07.7
22	40°27.9	122°25.0	-24°43.4	184°19.2	-13°41.1	130°40.3	-23°17.9	110°53.8	-22°07.6
23	55°30.4	137°24.1	-24°43.3	199°20.0	-13°41.6	145°42.1	-23°17.9	125°56.0	-22°07.6
Mer.pass.:19:18		v-0.9 d0.1 m-3.8		v0.9 d-0.6 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	70°32.9	152°23.1	-24°43.2	214°20.9	-13°42.2	160°44.0	-23°17.9	140°58.2	-22°07.6
1	85°35.3	167°22.2	-24°43.1	229°21.8	-13°42.7	175°45.8	-23°17.9	156°00.4	-22°07.5
2	100°37.8	182°21.3	-24°43.0	244°22.6	-13°43.3	190°47.7	-23°18.0	171°02.6	-22°07.5
3	115°40.3	197°20.3	-24°42.9	259°23.5	-13°43.8	205°49.5	-23°18.0	186°04.8	-22°07.5
4	130°42.7	212°19.4	-24°42.7	274°24.3	-13°44.4	220°51.4	-23°18.0	201°07.0	-22°07.5
5	145°45.2	227°18.4	-24°42.6	289°25.2	-13°44.9	235°53.3	-23°18.0	216°09.2	-22°07.4
6	160°47.7	242°17.5	-24°42.5	304°26.0	-13°45.4	250°55.1	-23°18.0	231°11.4	-22°07.4
7	175°50.1	257°16.5	-24°42.4	319°26.9	-13°46.0	265°57.0	-23°18.0	246°13.6	-22°07.4
8	190°52.6	272°15.6	-24°42.3	334°27.7	-13°46.5	280°58.8	-23°18.0	261°15.8	-22°07.3
9	205°55.1	287°14.7	-24°42.2	349°28.6	-13°47.1	296°00.7	-23°18.0	276°18.0	-22°07.3
10	220°57.5	302°13.7	-24°42.1	4°29.5	-13°47.6	311°02.6	-23°18.0	291°20.2	-22°07.3
11	235°60.0	317°12.8	-24°42.0	19°30.3	-13°48.2	326°04.4	-23°18.0	306°22.4	-22°07.2
12	251°02.4	332°11.8	-24°41.8	34°31.2	-13°48.7	341°06.3	-23°18.0	321°24.6	-22°07.2
13	266°04.9	347°10.9	-24°41.7	49°32.0	-13°49.3	356°08.1	-23°18.0	336°26.7	-22°07.2
14	281°07.4	2°10.0	-24°41.6	64°32.9	-13°49.8	11°10.0	-23°18.0	351°28.9	-22°07.1
15	296°09.8	17°09.0	-24°41.5	79°33.7	-13°50.4	26°11.8	-23°18.0	6°31.1	-22°07.1
16	311°12.3	32°08.1	-24°41.4	94°34.6	-13°50.9	41°13.7	-23°18.0	21°33.3	-22°07.1
17	326°14.8	47°07.1	-24°41.2	109°35.4	-13°51.5	56°15.6	-23°18.0	36°35.5	-22°07.1
18	341°17.2	62°06.2	-24°41.1	124°36.3	-13°52.0	71°17.4	-23°18.0	51°37.7	-22°07.0
19	356°19.7	77°05.3	-24°41.0	139°37.2	-13°52.6	86°19.3	-23°18.0	66°39.9	-22°07.0
20	11°22.2	92°04.3	-24°40.8	154°38.0	-13°53.1	101°21.1	-23°18.0	81°42.1	-22°07.0
21	26°24.6	107°03.4	-24°40.7	169°38.9	-13°53.7	116°23.0	-23°18.0	96°44.3	-22°06.9
22	41°27.1	122°02.4	-24°40.6	184°39.7	-13°54.2	131°24.9	-23°18.0	111°46.5	-22°06.9
23	56°29.5	137°01.5	-24°40.4	199°40.6	-13°54.7	146°26.7	-23°18.0	126°48.7	-22°06.9
Mer.pass.:19:14		v-0.9 d0.1 m-3.8		v0.9 d-0.5 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.2
Schedar	349°35.2	56°38.9
Diphda	348°51.2	-17°52.8
Achernar	335°23.0	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°24.5	89°20.9
Akamar	315°14.6	-40°13.7
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.8
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.5	46°01.0
Bellatrix	278°26.9	6°22.0
Elnath	278°06.7	28°37.3
Alnilam	275°41.6	-1°11.4
Betelgeuse	270°56.2	7°24.5
Canopus	263°53.7	-52°42.3
Sirius	258°29.4	-16°44.4
Adara	255°08.7	-28°59.9
Procyon	244°54.8	5°10.5
Pollux	243°22.0	27°58.6
Avior	234°15.9	-59°34.1
Suhail	222°49.0	-43°30.5
Miaplacidus	221°38.5	-69°47.6
Alphard	217°51.6	-8°44.6
Regulus	207°38.7	11°52.2
Dubhe	193°46.3	61°38.4
Denebola	182°29.2	14°27.7
Gienah	175°47.9	-17°38.9
Acrux	173°04.7	-63°12.1
Gacrux	171°56.3	-57°13.1
Alioth	166°17.1	55°51.0
Spica	158°26.8	-11°15.7
Alcaid	152°55.7	49°12.8
Hadar	148°42.2	-60°27.8
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.2
Rigil Kent.	139°46.3	-60°54.7
Zubenelg.	137°00.8	-16°07.2
Kochab	137°21.1	74°04.4
Alphecca	126°07.6	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.6	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°33.0
Etamin	90°44.6	51°29.4
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.2
Altair	62°04.2	8°55.3
Peacock	53°12.6	-56°40.4
Deneb	49°28.7	45°21.3
Enif	33°42.9	9°58.1
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.1	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/11/	SHA	Mer.pass
Venus	84°33.9	13:48
Mars	145°05.0	09:45
Jupiter	90°40.1	13:21
Saturn	70°38.2	14:41

2019/12/	SHA	Mer.pass
Venus	83°12.1	13:50
Mars	144°26.5	09:43
Jupiter	90°25.6	13:18
Saturn	70°31.8	14:37

2019/12/	SHA	Mer.pass
Venus	81°50.3	13:51
Mars	143°48.0	09:42
Jupiter	90°11.1	13:15
Saturn	70°25.4	14:34

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	182°54.7	-21°33.2	137°30.4	8.6	-23°00.2	1.7	56.4
1	197°54.5	-21°33.6	151°58.0	8.6	-22°58.4	1.9	56.4
2	212°54.2	-21°34.0	166°25.7	8.7	-22°56.5	2.0	56.3
3	227°54.0	-21°34.4	180°53.4	8.8	-22°54.4	2.1	56.3
4	242°53.8	-21°34.8	195°21.2	8.8	-22°52.3	2.2	56.3
5	257°53.6	-21°35.2	209°49.1	8.9	-22°50.0	2.4	56.2
6	272°53.3	-21°35.6	224°17.0	8.9	-22°47.6	2.5	56.2
7	287°53.1	-21°36.1	238°45.0	9.0	-22°45.0	2.6	56.2
8	302°52.9	-21°36.5	253°13.0	9.1	-22°42.4	2.7	56.1
9	317°52.7	-21°36.9	267°41.1	9.1	-22°39.6	2.8	56.1
10	332°52.4	-21°37.3	282°09.2	9.2	-22°36.7	3.0	56.1
11	347°52.2	-21°37.7	296°37.4	9.2	-22°33.7	3.1	56.1
12	2°52.0	-21°38.1	311°05.7	9.3	-22°30.6	3.2	56.0
13	17°51.8	-21°38.5	325°34.1	9.4	-22°27.3	3.3	56.0
14	32°51.5	-21°38.9	340°02.5	9.4	-22°24.0	3.4	56.0
15	47°51.3	-21°39.3	354°31.0	9.5	-22°20.5	3.5	55.9
16	62°51.1	-21°39.7	8°59.5	9.6	-22°16.9	3.6	55.9
17	77°50.8	-21°40.1	23°28.1	9.6	-22°13.2	3.8	55.9
18	92°50.6	-21°40.5	37°56.8	9.7	-22°09.4	3.9	55.9
19	107°50.4	-21°40.9	52°25.5	9.8	-22°05.5	4.0	55.8
20	122°50.2	-21°41.3	66°54.4	9.9	-22°01.4	4.1	55.8
21	137°49.9	-21°41.7	81°23.2	9.9	-21°57.3	4.2	55.8
22	152°49.7	-21°42.1	95°52.2	10.0	-21°53.0	4.3	55.7
23	167°49.5	-21°42.5	110°21.2	10.1	-21°48.7	4.4	55.7
	SD.=16.2	d=-0.4			S.D.=15.4		

Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	182°49.2	-21°42.9	124°50.3	10.1	-21°44.2	4.5	55.7
1	197°49.0	-21°43.3	139°19.5	10.2	-21°39.6	4.6	55.7
2	212°48.8	-21°43.7	153°48.7	10.3	-21°35.0	4.7	55.6
3	227°48.6	-21°44.1	168°18.0	10.3	-21°30.2	4.8	55.6
4	242°48.3	-21°44.5	182°47.4	10.4	-21°25.3	4.9	55.6
5	257°48.1	-21°44.9	197°16.8	10.5	-21°20.3	5.0	55.6
6	272°47.9	-21°45.3	211°46.4	10.6	-21°15.2	5.1	55.5
7	287°47.6	-21°45.7	226°16.0	10.6	-21°10.0	5.2	55.5
8	302°47.4	-21°46.1	240°45.6	10.7	-21°04.7	5.3	55.5
9	317°47.2	-21°46.5	255°15.4	10.8	-20°59.3	5.4	55.4
10	332°46.9	-21°46.9	269°45.2	10.8	-20°53.9	5.5	55.4
11	347°46.7	-21°47.3	284°15.1	10.9	-20°48.3	5.6	55.4
12	2°46.5	-21°47.7	298°45.0	11.0	-20°42.6	5.7	55.4
13	17°46.2	-21°48.0	313°15.0	11.1	-20°36.8	5.8	55.3
14	32°46.0	-21°48.4	327°45.1	11.1	-20°30.9	5.9	55.3
15	47°45.8	-21°48.8	342°15.3	11.2	-20°25.0	6.0	55.3
16	62°45.5	-21°49.2	356°45.6	11.3	-20°18.9	6.1	55.3
17	77°45.3	-21°49.6	11°15.9	11.4	-20°12.7	6.2	55.2
18	92°45.1	-21°50.0	25°46.3	11.4	-20°06.5	6.3	55.2
19	107°44.8	-21°50.4	40°16.7	11.5	-20°00.2	6.4	55.2
20	122°44.6	-21°50.7	54°47.3	11.6	-19°53.7	6.5	55.2
21	137°44.4	-21°51.1	69°17.9	11.6	-19°47.2	6.6	55.2
22	152°44.1	-21°51.5	83°48.6	11.7	-19°40.6	6.6	55.1
23	167°43.9	-21°51.9	98°19.3	11.8	-19°33.9	6.7	55.1
	SD.=16.2	d=-0.4			S.D.=15.2		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°43.7	-21°52.3	112°50.1	11.9	-19°27.2	6.8	55.1
1	197°43.4	-21°52.7	127°21.0	11.9	-19°20.3	6.9	55.1
2	212°43.2	-21°53.0	141°52.0	12.0	-19°13.4	7.0	55.0
3	227°42.9	-21°53.4	156°23.1	12.1	-19°06.3	7.1	55.0
4	242°42.7	-21°53.8	170°54.2	12.1	-18°59.2	7.2	55.0
5	257°42.5	-21°54.2	185°25.4	12.2	-18°52.0	7.2	55.0
6	272°42.2	-21°54.5	199°56.6	12.3	-18°44.8	7.3	55.0
7	287°42.0	-21°54.9	214°27.9	12.4	-18°37.4	7.4	54.9
8	302°41.8	-21°55.3	228°59.3	12.4	-18°30.0	7.5	54.9
9	317°41.5	-21°55.7	243°30.8	12.5	-18°22.5	7.5	54.9
10	332°41.3	-21°56.0	258°02.3	12.6	-18°14.9	7.6	54.9
11	347°41.0	-21°56.4	272°33.9	12.6	-18°07.2	7.7	54.9
12	2°40.8	-21°56.8	287°05.6	12.7	-17°59.5	7.8	54.8
13	17°40.6	-21°57.2	301°37.3	12.8	-17°51.7	7.9	54.8
14	32°40.3	-21°57.5	316°09.2	12.8	-17°43.8	7.9	54.8
15	47°40.1	-21°57.9	330°41.0	12.9	-17°35.8	8.0	54.8
16	62°39.8	-21°58.3	345°13.0	13.0	-17°27.8	8.1	54.8
17	77°39.6	-21°58.6	359°45.0	13.0	-17°19.7	8.1	54.7
18	92°39.4	-21°59.0	14°17.1	13.1	-17°11.5	8.2	54.7
19	107°39.1	-21°59.4	28°49.2	13.2	-17°03.2	8.3	54.7
20	122°38.9	-21°59.7	43°21.4	13.2	-16°54.9	8.3	54.7
21	137°38.6	-22°00.1	57°53.7	13.3	-16°46.5	8.4	54.7
22	152°38.4	-22°00.5	72°26.0	13.4	-16°38.1	8.5	54.7
23	167°38.2	-22°00.8	86°58.4	13.4	-16°29.6	8.6	54.6
	SD.=16.2	d=-0.4			S.D.=15.0		

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
72	07:50	09:49	–:–	–:–	13:48	15:47
70	07:34	09:10	–:–	–:–	14:27	16:03
68	07:21	08:43	10:34	13:03	14:54	16:16
66	07:10	08:22	09:46	13:52	15:15	16:27
64	07:01	08:06	09:15	14:22	15:32	16:37
62	06:52	07:52	08:52	14:45	15:45	16:45
60	06:45	07:40	08:34	15:03	15:57	16:52
58	06:39	07:30	08:19	15:18	16:08	16:59
56	06:33	07:21	08:06	15:31	16:17	17:04
54	06:28	07:13	07:55	15:42	16:25	17:10
52	06:23	07:05	07:45	15:52	16:32	17:15
50	06:18	06:59	07:36	16:01	16:39	17:19
45	06:08	06:44	07:17	16:20	16:53	17:30
40	05:59	06:32	07:02	16:35	17:05	17:39
35	05:50	06:21	06:49	16:48	17:16	17:47
30	05:42	06:12	06:38	16:60	17:26	17:55
20	05:27	05:55	06:18	17:19	17:43	18:10
10	05:13	05:39	06:01	17:36	17:59	18:25
0	04:57	05:23	05:45	17:53	18:15	18:41
-10	04:40	05:06	05:29	18:09	18:32	18:58
-20	04:19	04:47	05:12	18:26	18:51	19:19
-30	03:52	04:24	04:51	18:47	19:14	19:46
-35	03:35	04:10	04:39	18:59	19:28	20:04
-40	03:14	03:54	04:26	19:13	19:45	20:25
-45	02:46	03:33	04:09	19:29	20:05	20:53
-50	02:07	03:07	03:49	19:50	20:32	21:32
-52	01:45	02:53	03:39	19:59	20:45	21:54
-54	01:16	02:38	03:28	20:10	21:01	22:25
-56	00:20	02:19	03:16	20:23	21:20	23:28
-58	–:–	01:56	03:01	20:38	21:44	–:–
-60	–:–	01:24	02:44	20:55	22:17	–:–

Lat.	Moonrise			Moonset		
	Sat	Sun	Mon	Sat	Sun	Mon
72	–:–	–:–	16:06	–:–	–:–	18:11
70	–:–	–:–	15:02	–:–	–:–	19:14
68	–:–	14:43	14:26	–:–	17:54	19:49
66	13:54	13:60	14:00	16:57	18:36	20:14
64	13:12	13:31	13:40	17:39	19:05	20:33
62	12:43	13:09	13:24	18:07	19:26	20:49
60	12:21	12:51	13:10	18:29	19:44	21:02
58	12:03	12:36	12:59	18:46	19:58	21:13
56	11:48	12:23	12:48	19:01	20:11	21:23
54	11:35	12:12	12:39	19:14	20:21	21:31
52	11:24	12:02	12:31	19:25	20:31	21:39
50	11:13	11:53	12:24	19:35	20:40	21:46
45	10:52	11:34	12:08	19:56	20:58	22:00
40	10:35	11:18	11:55	20:13	21:12	22:12
35	10:20	11:05	11:44	20:27	21:25	22:22
30	10:08	10:54	11:35	20:39	21:36	22:31
20	09:46	10:34	11:18	21:00	21:54	22:46
10	09:28	10:17	11:03	21:18	22:10	22:60
0	09:10	10:01	10:50	21:35	22:25	23:12
-10	08:53	09:46	10:36	21:52	22:40	23:24
-20	08:34	09:28	10:21	22:10	22:56	23:37
-30	08:12	09:09	10:05	22:31	23:14	23:52
-35	07:60	08:57	09:55	22:43	23:24	–:–
-40	07:45	08:44	09:44	22:56	23:36	–:–
-45	07:28	08:28	09:30	23:13	23:51	–:–
-50	07:06	08:09	09:14	23:33	–:–	00:08
-52	06:56	07:60	09:06	23:42	–:–	00:16
-54	06:44	07:49	08:58	23:53	–:–	00:25
-56	06:31	07:37	08:48	–:–	00:05	00:35
-58	06:16	07:24	08:37	–:–	00:19	00:46
-60	05:57	07:08	08:25	–:–	00:35	00:59

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
30	11:39	11:28	11:48	15:22	02:56	4(16%)
1	11:17	11:06	11:48	16:13	03:48	5(25%)
2	10:55	10:43	11:49	17:01	04:37	6(33%)

December 03, 04 ,05 (Tue., Wed., Thu.)

	Aries	Venus		Mars		Jupiter		Saturn	
Tue	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	71°32.0	152°00.6	-24°40.3	214°41.4	-13°55.3	161°28.6	-23°18.1	141°50.9	-22°06.8
1	86°34.5	166°59.6	-24°40.2	229°42.3	-13°55.8	176°30.4	-23°18.1	156°53.0	-22°06.8
2	101°36.9	181°58.7	-24°40.0	244°43.1	-13°56.4	191°32.3	-23°18.1	171°55.2	-22°06.8
3	116°39.4	196°57.7	-24°39.9	259°44.0	-13°56.9	206°34.1	-23°18.1	186°57.4	-22°06.7
4	131°41.9	211°56.8	-24°39.8	274°44.8	-13°57.5	221°36.0	-23°18.1	201°59.6	-22°06.7
5	146°44.3	226°55.9	-24°39.6	289°45.7	-13°58.0	236°37.9	-23°18.1	217°01.8	-22°06.7
6	161°46.8	241°54.9	-24°39.5	304°46.5	-13°58.6	251°39.7	-23°18.1	232°04.0	-22°06.7
7	176°49.3	256°54.0	-24°39.3	319°47.4	-13°59.1	266°41.6	-23°18.1	247°06.2	-22°06.6
8	191°51.7	271°53.0	-24°39.2	334°48.2	-13°59.6	281°43.4	-23°18.1	262°08.4	-22°06.6
9	206°54.2	286°52.1	-24°39.1	349°49.1	-14°00.2	296°45.3	-23°18.1	277°10.6	-22°06.6
10	221°56.7	301°51.2	-24°38.9	4°49.9	-14°00.7	311°47.1	-23°18.1	292°12.8	-22°06.5
11	236°59.1	316°50.2	-24°38.8	19°50.8	-14°01.3	326°49.0	-23°18.1	307°15.0	-22°06.5
12	252°01.6	331°49.3	-24°38.6	34°51.7	-14°01.8	341°50.9	-23°18.1	322°17.1	-22°06.5
13	267°04.0	346°48.4	-24°38.5	49°52.5	-14°02.4	356°52.7	-23°18.1	337°19.3	-22°06.4
14	282°06.5	1°47.4	-24°38.3	64°53.4	-14°02.9	11°54.6	-23°18.1	352°21.5	-22°06.4
15	297°09.0	16°46.5	-24°38.2	79°54.2	-14°03.4	26°56.4	-23°18.1	7°23.7	-22°06.4
16	312°11.4	31°45.5	-24°38.0	94°55.1	-14°04.0	41°58.3	-23°18.1	22°25.9	-22°06.3
17	327°13.9	46°44.6	-24°37.8	109°55.9	-14°04.5	57°00.1	-23°18.1	37°28.1	-22°06.3
18	342°16.4	61°43.7	-24°37.7	124°56.8	-14°05.1	72°02.0	-23°18.1	52°30.3	-22°06.3
19	357°18.8	76°42.7	-24°37.5	139°57.6	-14°05.6	87°03.9	-23°18.1	67°32.5	-22°06.3
20	12°21.3	91°41.8	-24°37.4	154°58.5	-14°06.2	102°05.7	-23°18.1	82°34.7	-22°06.2
21	27°23.8	106°40.9	-24°37.2	169°59.3	-14°06.7	117°07.6	-23°18.1	97°36.9	-22°06.2
22	42°26.2	121°39.9	-24°37.0	185°00.2	-14°07.2	132°09.4	-23°18.1	112°39.0	-22°06.2
23	57°28.7	136°39.0	-24°36.9	200°01.0	-14°07.8	147°11.3	-23°18.1	127°41.2	-22°06.1
Mer.pass.:19:10		v-0.9 d0.1 m-3.8		v0.9 d-0.5 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	72°31.2	151°38.1	-24°36.7	215°01.9	-14°08.3	162°13.1	-23°18.1	142°43.4	-22°06.1
1	87°33.6	166°37.1	-24°36.5	230°02.7	-14°08.9	177°15.0	-23°18.1	157°45.6	-22°06.1
2	102°36.1	181°36.2	-24°36.4	245°03.6	-14°09.4	192°16.8	-23°18.1	172°47.8	-22°06.0
3	117°38.5	196°35.2	-24°36.2	260°04.4	-14°09.9	207°18.7	-23°18.1	187°50.0	-22°06.0
4	132°41.0	211°34.3	-24°36.0	275°05.3	-14°10.5	222°20.6	-23°18.1	202°52.2	-22°06.0
5	147°43.5	226°33.4	-24°35.9	290°06.1	-14°11.0	237°22.4	-23°18.2	217°54.4	-22°05.9
6	162°45.9	241°32.4	-24°35.7	305°07.0	-14°11.6	252°24.3	-23°18.2	232°56.6	-22°05.9
7	177°48.4	256°31.5	-24°35.5	320°07.8	-14°12.1	267°26.1	-23°18.2	247°58.8	-22°05.9
8	192°50.9	271°30.6	-24°35.3	335°08.7	-14°12.6	282°28.0	-23°18.2	263°00.9	-22°05.8
9	207°53.3	286°29.6	-24°35.2	350°09.5	-14°13.2	297°29.8	-23°18.2	278°03.1	-22°05.8
10	222°55.8	301°28.7	-24°35.0	5°10.3	-14°13.7	312°31.7	-23°18.2	293°05.3	-22°05.8
11	237°58.3	316°27.8	-24°34.8	20°11.2	-14°14.3	327°33.5	-23°18.2	308°07.5	-22°05.8
12	253°00.7	331°26.8	-24°34.6	35°12.0	-14°14.8	342°35.4	-23°18.2	323°09.7	-22°05.7
13	268°03.2	346°25.9	-24°34.5	50°12.9	-14°15.3	357°37.3	-23°18.2	338°11.9	-22°05.7
14	283°05.6	1°25.0	-24°34.3	65°13.7	-14°15.9	12°39.1	-23°18.2	353°14.1	-22°05.7
15	298°08.1	16°24.0	-24°34.1	80°14.6	-14°16.4	27°41.0	-23°18.2	8°16.3	-22°05.6
16	313°10.6	31°23.1	-24°33.9	95°15.4	-14°17.0	42°42.8	-23°18.2	23°18.4	-22°05.6
17	328°13.0	46°22.2	-24°33.7	110°16.3	-14°17.5	57°44.7	-23°18.2	38°20.6	-22°05.6
18	343°15.5	61°21.2	-24°33.5	125°17.1	-14°18.0	72°46.5	-23°18.2	53°22.8	-22°05.5
19	358°18.0	76°20.3	-24°33.3	140°18.0	-14°18.6	87°48.4	-23°18.2	68°25.0	-22°05.5
20	13°20.4	91°19.4	-24°33.1	155°18.8	-14°19.1	102°50.2	-23°18.2	83°27.2	-22°05.5
21	28°22.9	106°18.5	-24°33.0	170°19.7	-14°19.7	117°52.1	-23°18.2	98°29.4	-22°05.4
22	43°25.4	121°17.5	-24°32.8	185°20.5	-14°20.2	132°53.9	-23°18.2	113°31.6	-22°05.4
23	58°27.8	136°16.6	-24°32.6	200°21.4	-14°20.7	147°55.8	-23°18.2	128°33.8	-22°05.4
Mer.pass.:19:06		v-0.9 d0.2 m-3.8		v0.8 d-0.5 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	73°30.3	151°15.7	-24°32.4	215°22.2	-14°21.3	162°57.7	-23°18.2	143°35.9	-22°05.3
1	88°32.8	166°14.7	-24°32.2	230°23.0	-14°21.8	177°59.5	-23°18.2	158°38.1	-22°05.3
2	103°35.2	181°13.8	-24°32.0	245°23.9	-14°22.3	193°01.4	-23°18.2	173°40.3	-22°05.3
3	118°37.7	196°12.9	-24°31.8	260°24.7	-14°22.9	208°03.2	-23°18.2	188°42.5	-22°05.2
4	133°40.1	211°11.9	-24°31.6	275°25.6	-14°23.4	223°05.1	-23°18.2	203°44.7	-22°05.2
5	148°42.6	226°11.0	-24°31.4	290°26.4	-14°23.9	238°06.9	-23°18.2	218°46.9	-22°05.2
6	163°45.1	241°10.1	-24°31.2	305°27.3	-14°24.5	253°08.8	-23°18.2	233°49.1	-22°05.1
7	178°47.5	256°09.1	-24°31.0	320°28.1	-14°25.0	268°10.6	-23°18.2	248°51.3	-22°05.1
8	193°50.0	271°08.2	-24°30.8	335°29.0	-14°25.6	283°12.5	-23°18.2	263°53.4	-22°05.1
9	208°52.5	286°07.3	-24°30.5	350°29.8	-14°26.1	298°14.3	-23°18.2	278°55.6	-22°05.1
10	223°54.9	301°06.4	-24°30.3	5°30.7	-14°26.6	313°16.2	-23°18.2	293°57.8	-22°05.0
11	238°57.4	316°05.4	-24°30.1	20°31.5	-14°27.2	328°18.1	-23°18.2	309°00.0	-22°05.0
12	253°59.9	331°04.5	-24°29.9	35°32.3	-14°27.7	343°19.9	-23°18.2	324°02.2	-22°05.0
13	269°02.3	346°03.6	-24°29.7	50°33.2	-14°28.2	358°21.8	-23°18.2	339°04.4	-22°04.9
14	284°04.8	1°02.7	-24°29.5	65°34.0	-14°28.8	13°23.6	-23°18.2	354°06.6	-22°04.9
15	299°07.3	16°01.7	-24°29.3	80°34.9	-14°29.3	28°25.5	-23°18.2	9°08.8	-22°04.9
16	314°09.7	31°00.8	-24°29.1	95°35.7	-14°29.8	43°27.3	-23°18.2	24°10.9	-22°04.8
17	329°12.2	45°59.9	-24°28.8	110°36.6	-14°30.4	58°29.2	-23°18.2	39°13.1	-22°04.8
18	344°14.6	60°58.9	-24°28.6	125°37.4	-14°30.9	73°31.0	-23°18.2	54°15.3	-22°04.8
19	359°17.1	75°58.0	-24°28.4	140°38.2	-14°31.4	88°32.9	-23°18.2	69°17.5	-22°04.7
20	14°19.6	90°57.1	-24°28.2	155°39.1	-14°32.0	103°34.7	-23°18.2	84°19.7	-22°04.7
21	29°22.0	105°56.2	-24°28.0	170°39.9	-14°32.5	118°36.6	-23°18.2	99°21.9	-22°04.7
22	44°24.5	120°55.2	-24°27.7	185°40.8	-14°33.0	133°38.4	-23°18.2	114°24.1	-22°04.6
23	59°27.0	135°54.3	-24°27.5	200°41.6	-14°33.6	148°40.3	-23°18.2	129°26.2	-22°04.6
Mer.pass.:19:02		v-0.9 d0.2 m-3.8		v0.8 d-0.5 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.2
Schedar	349°35.2	56°38.9
Diphda	348°51.2	-17°52.8
Achernar	335°23.0	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°25.0	89°20.9
Akamar	315°14.6	-40°13.7
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.9
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°22.0
Elnath	278°06.7	28°37.3
Alnilam	275°41.6	-1°11.4
Betelgeuse	270°56.2	7°24.5
Canopus	263°53.7	-52°42.3
Sirius	258°29.4	-16°44.4
Adara	255°08.7	-28°59.9
Procyon	244°54.8	5°10.5
Pollux	243°22.0	27°58.6
Avior	234°15.9	-59°34.1
Suhail	222°49.0	-43°30.5
Miaplacidus	221°38.4	-69°47.6
Alphard	217°51.6	-8°44.6
Regulus	207°38.7	11°52.2
Dubhe	193°46.3	61°38.4
Denebola	182°29.2	14°27.7
Gienah	175°47.9	-17°38.9
Acrux	173°04.7	-63°12.1
Gacrux	171°56.3	-57°13.1
Alioth	166°17.1	55°51.0
Spica	158°26.8	-11°15.7
Alcaid	152°55.7	49°12.8
Hadar	148°42.1	-60°27.8
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.1
Rigil Kent.	139°46.3	-60°54.7
Zubenelg.	137°00.8	-16°07.2
Kochab	137°21.1	74°04.4
Alphecca	126°07.6	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.6	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.4
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.2
Altair	62°04.2	8°55.3
Peacock	53°12.6	-56°40.4
Deneb	49°28.8	45°21.3
Enif	33°42.9	9°58.0
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/12/	**SHA**	**Mer.pass**
Venus	80°28.5	13:53
Mars	143°09.4	09:41
Jupiter	89°56.6	13:12
Saturn	70°18.8	14:30

2019/12/	**SHA**	**Mer.pass**
Venus	79°06.9	13:54
Mars	142°30.7	09:39
Jupiter	89°42.0	13:09
Saturn	70°12.3	14:27

2019/12/	**SHA**	**Mer.pass**
Venus	77°45.4	13:56
Mars	141°51.9	09:38
Jupiter	89°27.4	13:07
Saturn	70°05.7	14:24

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	182°37.9	-22°01.2	101°30.9	13.5	-16°21.0	8.6	54.6
1	197°37.7	-22°01.6	116°03.4	13.6	-16°12.3	8.7	54.6
2	212°37.4	-22°01.9	130°36.0	13.6	-16°03.6	8.7	54.6
3	227°37.2	-22°02.3	145°08.6	13.7	-15°54.8	8.8	54.6
4	242°36.9	-22°02.6	159°41.4	13.7	-15°46.0	8.9	54.6
5	257°36.7	-22°03.0	174°14.1	13.8	-15°37.1	8.9	54.6
6	272°36.5	-22°03.4	188°47.0	13.9	-15°28.1	9.0	54.5
7	287°36.2	-22°03.7	203°19.8	13.9	-15°19.1	9.1	54.5
8	302°36.0	-22°04.1	217°52.8	14.0	-15°10.0	9.1	54.5
9	317°35.7	-22°04.4	232°25.8	14.0	-15°00.9	9.2	54.5
10	332°35.5	-22°04.8	246°58.9	14.1	-14°51.7	9.2	54.5
11	347°35.2	-22°05.1	261°32.0	14.1	-14°42.4	9.3	54.5
12	2°35.0	-22°05.5	276°05.2	14.2	-14°33.1	9.3	54.5
13	17°34.7	-22°05.9	290°38.4	14.3	-14°23.7	9.4	54.4
14	32°34.5	-22°06.2	305°11.7	14.3	-14°14.3	9.5	54.4
15	47°34.2	-22°06.6	319°45.0	14.4	-14°04.8	9.5	54.4
16	62°34.0	-22°06.9	334°18.4	14.4	-13°55.3	9.6	54.4
17	77°33.8	-22°07.3	348°51.9	14.5	-13°45.7	9.6	54.4
18	92°33.5	-22°07.6	3°25.3	14.5	-13°36.1	9.7	54.4
19	107°33.3	-22°08.0	17°58.9	14.6	-13°26.4	9.7	54.4
20	122°33.0	-22°08.3	32°32.5	14.6	-13°16.6	9.8	54.4
21	137°32.8	-22°08.7	47°06.1	14.7	-13°06.8	9.8	54.4
22	152°32.5	-22°09.0	61°39.8	14.7	-12°57.0	9.9	54.4
23	167°32.3	-22°09.4	76°13.6	14.8	-12°47.1	9.9	54.3
	SD.=16.2	d=-0.4			S.D.=14.9		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	182°32.0	-22°09.7	90°47.4	14.8	-12°37.2	10.0	54.3
1	197°31.8	-22°10.0	105°21.2	14.9	-12°27.2	10.0	54.3
2	212°31.5	-22°10.4	119°55.1	14.9	-12°17.1	10.1	54.3
3	227°31.3	-22°10.7	134°29.0	15.0	-12°07.1	10.1	54.3
4	242°31.0	-22°11.1	149°03.0	15.0	-11°56.9	10.2	54.3
5	257°30.8	-22°11.4	163°37.0	15.0	-11°46.8	10.2	54.3
6	272°30.5	-22°11.8	178°11.1	15.1	-11°36.5	10.2	54.3
7	287°30.3	-22°12.1	192°45.2	15.1	-11°26.3	10.3	54.3
8	302°30.0	-22°12.4	207°19.3	15.2	-11°16.0	10.3	54.3
9	317°29.8	-22°12.8	221°53.5	15.2	-11°05.6	10.4	54.3
10	332°29.5	-22°13.1	236°27.7	15.2	-10°55.2	10.4	54.3
11	347°29.3	-22°13.5	251°02.0	15.3	-10°44.8	10.4	54.3
12	2°29.0	-22°13.8	265°36.3	15.3	-10°34.3	10.5	54.3
13	17°28.8	-22°14.1	280°10.6	15.4	-10°23.8	10.5	54.2
14	32°28.5	-22°14.5	294°45.0	15.4	-10°13.3	10.6	54.2
15	47°28.3	-22°14.8	309°19.4	15.4	-10°02.7	10.6	54.2
16	62°28.0	-22°15.1	323°53.9	15.5	-9°52.1	10.6	54.2
17	77°27.8	-22°15.5	338°28.3	15.5	-9°41.4	10.7	54.2
18	92°27.5	-22°15.8	353°02.8	15.5	-9°30.7	10.7	54.2
19	107°27.3	-22°16.1	7°37.4	15.6	-9°20.0	10.8	54.2
20	122°27.0	-22°16.5	22°12.0	15.6	-9°09.2	10.8	54.2
21	137°26.7	-22°16.8	36°46.6	15.6	-8°58.4	10.8	54.2
22	152°26.5	-22°17.1	51°21.2	15.6	-8°47.6	10.9	54.2
23	167°26.2	-22°17.4	65°55.9	15.7	-8°36.7	10.9	54.2
	SD.=16.2	d=-0.3			S.D.=14.8		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	182°26.0	-22°17.8	80°30.5	15.7	-8°25.8	10.9	54.2
1	197°25.7	-22°18.1	95°05.3	15.7	-8°14.9	11.0	54.2
2	212°25.5	-22°18.4	109°40.0	15.8	-8°03.9	11.0	54.2
3	227°25.2	-22°18.7	124°14.8	15.8	-7°52.9	11.0	54.2
4	242°25.0	-22°19.1	138°49.5	15.8	-7°41.9	11.0	54.2
5	257°24.7	-22°19.4	153°24.4	15.8	-7°30.8	11.1	54.2
6	272°24.5	-22°19.7	167°59.2	15.8	-7°19.7	11.1	54.2
7	287°24.2	-22°20.0	182°34.1	15.9	-7°08.6	11.1	54.2
8	302°23.9	-22°20.4	197°08.9	15.9	-6°57.5	11.2	54.2
9	317°23.7	-22°20.7	211°43.8	15.9	-6°46.3	11.2	54.2
10	332°23.4	-22°21.0	226°18.7	15.9	-6°35.1	11.2	54.2
11	347°23.2	-22°21.3	240°53.7	15.9	-6°23.9	11.2	54.2
12	2°22.9	-22°21.6	255°28.6	16.0	-6°12.6	11.3	54.2
13	17°22.7	-22°22.0	270°03.6	16.0	-6°01.3	11.3	54.2
14	32°22.4	-22°22.3	284°38.6	16.0	-5°50.0	11.3	54.2
15	47°22.1	-22°22.6	299°13.6	16.0	-5°38.7	11.3	54.2
16	62°21.9	-22°22.9	313°48.6	16.0	-5°27.3	11.4	54.2
17	77°21.6	-22°23.2	328°23.6	16.0	-5°16.0	11.4	54.2
18	92°21.4	-22°23.5	342°58.6	16.0	-5°04.6	11.4	54.2
19	107°21.1	-22°23.9	357°33.7	16.0	-4°53.2	11.4	54.2
20	122°20.8	-22°24.2	12°08.7	16.1	-4°41.7	11.4	54.3
21	137°20.6	-22°24.5	26°43.8	16.1	-4°30.3	11.5	54.3
22	152°20.3	-22°24.8	41°18.9	16.1	-4°18.8	11.5	54.3
23	167°20.1	-22°25.1	55°53.9	16.1	-4°07.3	11.5	54.3
	SD.=16.2	d=-0.3			S.D.=14.8		

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
72	07:58	10:02	–:–	–:–	13:37	15:41
70	07:41	09:20	–:–	–:–	14:20	15:59
68	07:27	08:51	10:53	12:47	14:49	16:13
66	07:16	08:29	09:56	13:44	15:11	16:24
64	07:06	08:12	09:23	14:17	15:28	16:34
62	06:57	07:57	08:59	14:41	15:42	16:42
60	06:50	07:45	08:40	14:60	15:55	16:50
58	06:43	07:34	08:24	15:15	16:05	16:57
56	06:37	07:25	08:11	15:29	16:15	17:03
54	06:31	07:17	07:59	15:40	16:23	17:08
52	06:26	07:09	07:49	15:51	16:31	17:14
50	06:21	07:02	07:40	15:60	16:37	17:18
45	06:11	06:48	07:21	16:19	16:52	17:29
40	06:01	06:35	07:05	16:35	17:05	17:39
35	05:53	06:24	06:52	16:48	17:16	17:47
30	05:45	06:14	06:40	16:60	17:26	17:55
20	05:29	05:56	06:20	17:20	17:44	18:11
10	05:14	05:40	06:03	17:37	17:60	18:26
0	04:58	05:24	05:46	17:54	18:16	18:42
-10	04:40	05:07	05:30	18:10	18:33	19:00
-20	04:19	04:48	05:12	18:28	18:53	19:22
-30	03:51	04:24	04:51	18:49	19:16	19:49
-35	03:34	04:10	04:39	19:01	19:31	20:07
-40	03:12	03:53	04:25	19:16	19:48	20:28
-45	02:44	03:32	04:08	19:33	20:09	20:57
-50	02:03	03:04	03:47	19:54	20:37	21:38
-52	01:40	02:51	03:37	20:04	20:50	22:01
-54	01:08	02:35	03:26	20:15	21:07	22:35
-56	–:–	02:15	03:13	20:28	21:26	–:–
-58	–:–	01:50	02:58	20:43	21:52	–:–
-60	–:–	01:15	02:40	21:02	22:28	–:–

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
72	15:05	14:37	14:16	20:45	22:43	–:–
70	14:37	14:21	14:08	21:12	22:57	–:–
68	14:16	14:08	14:01	21:32	23:08	–:–
66	13:59	13:58	13:55	21:47	23:17	–:–
64	13:46	13:49	13:51	21:60	23:24	–:–
62	13:34	13:41	13:46	22:11	23:31	–:–
60	13:24	13:34	13:43	22:20	23:37	–:–
58	13:15	13:29	13:40	22:28	23:41	–:–
56	13:08	13:23	13:37	22:35	23:46	–:–
54	13:01	13:19	13:34	22:41	23:50	–:–
52	12:55	13:14	13:32	22:46	23:53	–:–
50	12:49	13:11	13:30	22:51	23:57	–:–
45	12:37	13:02	13:25	23:02	–:–	00:04
40	12:27	12:55	13:21	23:11	–:–	00:09
35	12:18	12:49	13:17	23:19	–:–	00:14
30	12:11	12:44	13:14	23:25	–:–	00:19
20	11:58	12:34	13:09	23:37	–:–	00:26
10	11:46	12:26	13:05	23:47	–:–	00:33
0	11:35	12:18	13:00	23:56	–:–	00:39
-10	11:24	12:11	12:56	–:–	00:06	00:45
-20	11:13	12:02	12:51	–:–	00:16	00:51
-30	10:59	11:53	12:46	–:–	00:27	00:58
-35	10:52	11:48	12:43	00:01	00:33	01:03
-40	10:43	11:41	12:39	00:11	00:40	01:07
-45	10:32	11:34	12:35	00:22	00:49	01:13
-50	10:20	11:25	12:30	00:36	00:59	01:19
-52	10:14	11:21	12:28	00:42	01:04	01:22
-54	10:07	11:17	12:25	00:49	01:09	01:25
-56	10:00	11:12	12:23	00:57	01:14	01:29
-58	09:52	11:06	12:20	01:06	01:21	01:33
-60	09:43	10:60	12:16	01:16	01:28	01:37

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
3	10:32	10:20	11:49	17:45	05:23	7(43%)
4	10:08	09:56	11:50	18:28	06:07	8(52%)
5	09:44	09:32	11:50	19:10	06:49	9(61%)

December 06, 07 ,08 (Fri., Sat., Sun.)

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	74°29.4	150°53.4	-24°27.3	215°42.5	-14°34.1	163°42.2	-23°18.2	144°28.4	-22°04.6
1	89°31.9	165°52.5	-24°27.0	230°43.3	-14°34.6	178°44.0	-23°18.2	159°30.6	-22°04.5
2	104°34.4	180°51.5	-24°26.8	245°44.1	-14°35.2	193°45.9	-23°18.2	174°32.8	-22°04.5
3	119°36.8	195°50.6	-24°26.6	260°45.0	-14°35.7	208°47.7	-23°18.2	189°35.0	-22°04.5
4	134°39.3	210°49.7	-24°26.4	275°45.8	-14°36.2	223°49.6	-23°18.2	204°37.2	-22°04.4
5	149°41.7	225°48.8	-24°26.1	290°46.7	-14°36.8	238°51.4	-23°18.2	219°39.4	-22°04.4
6	164°44.2	240°47.8	-24°25.9	305°47.5	-14°37.3	253°53.3	-23°18.2	234°41.5	-22°04.4
7	179°46.7	255°46.9	-24°25.6	320°48.3	-14°37.8	268°55.1	-23°18.2	249°43.7	-22°04.3
8	194°49.1	270°46.0	-24°25.4	335°49.2	-14°38.4	283°57.0	-23°18.2	264°45.9	-22°04.3
9	209°51.6	285°45.1	-24°25.2	350°50.0	-14°38.9	298°58.8	-23°18.2	279°48.1	-22°04.3
10	224°54.1	300°44.2	-24°24.9	5°50.9	-14°39.4	314°00.7	-23°18.2	294°50.3	-22°04.2
11	239°56.5	315°43.2	-24°24.7	20°51.7	-14°40.0	329°02.5	-23°18.2	309°52.5	-22°04.2
12	254°59.0	330°42.3	-24°24.4	35°52.5	-14°40.5	344°04.4	-23°18.2	324°54.6	-22°04.2
13	270°01.5	345°41.4	-24°24.2	50°53.4	-14°41.0	359°06.2	-23°18.2	339°56.8	-22°04.2
14	285°03.9	0°40.5	-24°24.0	65°54.2	-14°41.5	14°08.1	-23°18.2	354°59.0	-22°04.1
15	300°06.4	15°39.5	-24°23.7	80°55.1	-14°42.1	29°09.9	-23°18.2	10°01.2	-22°04.1
16	315°08.9	30°38.6	-24°23.5	95°55.9	-14°42.6	44°11.8	-23°18.2	25°03.4	-22°04.1
17	330°11.3	45°37.7	-24°23.2	110°56.7	-14°43.1	59°13.6	-23°18.2	40°05.6	-22°04.0
18	345°13.8	60°36.8	-24°23.0	125°57.6	-14°43.7	74°15.5	-23°18.2	55°07.8	-22°04.0
19	0°16.2	75°35.9	-24°22.7	140°58.4	-14°44.2	89°17.3	-23°18.2	70°09.9	-22°04.0
20	15°18.7	90°34.9	-24°22.5	155°59.3	-14°44.7	104°19.2	-23°18.2	85°12.1	-22°03.9
21	30°21.2	105°34.0	-24°22.2	171°00.1	-14°45.3	119°21.1	-23°18.2	100°14.3	-22°03.9
22	45°23.6	120°33.1	-24°22.0	186°00.9	-14°45.8	134°22.9	-23°18.2	115°16.5	-22°03.9
23	60°26.1	135°32.2	-24°21.7	201°01.8	-14°46.3	149°24.8	-23°18.3	130°18.7	-22°03.8
Mer.pass.:18:58		v-0.9 d0.2 m-3.8		v0.8 d-0.5 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	75°28.6	150°31.3	-24°21.4	216°02.6	-14°46.8	164°26.6	-23°18.3	145°20.9	-22°03.8
1	90°31.0	165°30.3	-24°21.2	231°03.4	-14°47.4	179°28.5	-23°18.3	160°23.0	-22°03.8
2	105°33.5	180°29.4	-24°20.9	246°04.3	-14°47.9	194°30.3	-23°18.3	175°25.2	-22°03.7
3	120°36.0	195°28.5	-24°20.7	261°05.1	-14°48.4	209°32.2	-23°18.3	190°27.4	-22°03.7
4	135°38.4	210°27.6	-24°20.4	276°06.0	-14°48.9	224°34.0	-23°18.3	205°29.6	-22°03.7
5	150°40.9	225°26.7	-24°20.1	291°06.8	-14°49.5	239°35.9	-23°18.3	220°31.8	-22°03.6
6	165°43.3	240°25.8	-24°19.9	306°07.6	-14°50.0	254°37.7	-23°18.3	235°34.0	-22°03.6
7	180°45.8	255°24.8	-24°19.6	321°08.5	-14°50.5	269°39.6	-23°18.2	250°36.1	-22°03.6
8	195°48.3	270°23.9	-24°19.3	336°09.3	-14°51.1	284°41.4	-23°18.2	265°38.3	-22°03.5
9	210°50.7	285°23.0	-24°19.1	351°10.1	-14°51.6	299°43.3	-23°18.2	280°40.5	-22°03.5
10	225°53.2	300°22.1	-24°18.8	6°11.0	-14°52.1	314°45.1	-23°18.2	295°42.7	-22°03.5
11	240°55.7	315°21.2	-24°18.5	21°11.8	-14°52.6	329°47.0	-23°18.2	310°44.9	-22°03.4
12	255°58.1	330°20.3	-24°18.2	36°12.6	-14°53.2	344°48.8	-23°18.2	325°47.1	-22°03.4
13	271°00.6	345°19.3	-24°18.0	51°13.5	-14°53.7	359°50.7	-23°18.2	340°49.2	-22°03.4
14	286°03.1	0°18.4	-24°17.7	66°14.3	-14°54.2	14°52.5	-23°18.2	355°51.4	-22°03.3
15	301°05.5	15°17.5	-24°17.4	81°15.2	-14°54.7	29°54.4	-23°18.2	10°53.6	-22°03.3
16	316°08.0	30°16.6	-24°17.1	96°16.0	-14°55.3	44°56.2	-23°18.2	25°55.8	-22°03.3
17	331°10.5	45°15.7	-24°16.9	111°16.8	-14°55.8	59°58.1	-23°18.2	40°58.0	-22°03.2
18	346°12.9	60°14.8	-24°16.6	126°17.7	-14°56.3	74°59.9	-23°18.2	56°00.1	-22°03.2
19	1°15.4	75°13.9	-24°16.3	141°18.5	-14°56.8	90°01.8	-23°18.2	71°02.3	-22°03.2
20	16°17.8	90°12.9	-24°16.0	156°19.3	-14°57.4	105°03.6	-23°18.2	86°04.5	-22°03.1
21	31°20.3	105°12.0	-24°15.7	171°20.2	-14°57.9	120°05.5	-23°18.2	101°06.7	-22°03.1
22	46°22.8	120°11.1	-24°15.4	186°21.0	-14°58.4	135°07.3	-23°18.2	116°08.9	-22°03.1
23	61°25.2	135°10.2	-24°15.2	201°21.8	-14°58.9	150°09.2	-23°18.2	131°11.1	-22°03.0
Mer.pass.:18:54		v-0.9 d0.3 m-3.8		v0.8 d-0.5 m1.7		v1.9 d-0.0 m-1.7		v2.2 d0.0 m0.6	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	76°27.7	150°09.3	-24°14.9	216°22.7	-14°59.5	165°11.0	-23°18.2	146°13.2	-22°03.0
1	91°30.2	165°08.4	-24°14.6	231°23.5	-14°60.0	180°12.9	-23°18.2	161°15.4	-22°03.0
2	106°32.6	180°07.5	-24°14.3	246°24.3	-15°00.5	195°14.7	-23°18.2	176°17.6	-22°02.9
3	121°35.1	195°06.6	-24°14.0	261°25.2	-15°01.0	210°16.6	-23°18.2	191°19.8	-22°02.9
4	136°37.6	210°05.7	-24°13.7	276°26.0	-15°01.6	225°18.4	-23°18.2	206°22.0	-22°02.9
5	151°40.0	225°04.7	-24°13.4	291°26.8	-15°02.1	240°20.3	-23°18.2	221°24.1	-22°02.8
6	166°42.5	240°03.8	-24°13.1	306°27.7	-15°02.6	255°22.1	-23°18.2	236°26.3	-22°02.8
7	181°45.0	255°02.9	-24°12.8	321°28.5	-15°03.1	270°24.0	-23°18.2	251°28.5	-22°02.8
8	196°47.4	270°02.0	-24°12.5	336°29.3	-15°03.7	285°25.8	-23°18.2	266°30.7	-22°02.7
9	211°49.9	285°01.1	-24°12.2	351°30.2	-15°04.2	300°27.7	-23°18.2	281°32.9	-22°02.7
10	226°52.3	300°00.2	-24°11.9	6°31.0	-15°04.7	315°29.5	-23°18.2	296°35.1	-22°02.7
11	241°54.8	314°59.3	-24°11.6	21°31.8	-15°05.2	330°31.4	-23°18.2	311°37.2	-22°02.6
12	256°57.3	329°58.4	-24°11.3	36°32.7	-15°05.7	345°33.2	-23°18.2	326°39.4	-22°02.6
13	271°59.7	344°57.5	-24°11.0	51°33.5	-15°06.3	0°35.1	-23°18.2	341°41.6	-22°02.6
14	287°02.2	359°56.6	-24°10.7	66°34.3	-15°06.8	15°36.9	-23°18.2	356°43.8	-22°02.5
15	302°04.7	14°55.7	-24°10.4	81°35.2	-15°07.3	30°38.8	-23°18.2	11°46.0	-22°02.5
16	317°07.1	29°54.7	-24°10.1	96°36.0	-15°07.8	45°40.6	-23°18.2	26°48.1	-22°02.5
17	332°09.6	44°53.8	-24°09.8	111°36.8	-15°08.4	60°42.5	-23°18.2	41°50.3	-22°02.4
18	347°12.1	59°52.9	-24°09.5	126°37.6	-15°08.9	75°44.3	-23°18.2	56°52.5	-22°02.4
19	2°14.5	74°52.0	-24°09.2	141°38.5	-15°09.4	90°46.2	-23°18.2	71°54.7	-22°02.4
20	17°17.0	89°51.1	-24°08.8	156°39.3	-15°09.9	105°48.0	-23°18.2	86°56.9	-22°02.3
21	32°19.4	104°50.2	-24°08.5	171°40.1	-15°10.4	120°49.9	-23°18.2	101°59.0	-22°02.3
22	47°21.9	119°49.3	-24°08.2	186°41.0	-15°11.0	135°51.7	-23°18.2	117°01.2	-22°02.3
23	62°24.4	134°48.4	-24°07.9	201°41.8	-15°11.5	150°53.6	-23°18.2	132°03.4	-22°02.2
Mer.pass.:18:51		v-0.9 d0.3 m-3.8		v0.8 d-0.5 m1.7		v1.9 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.2
Schedar	349°35.3	56°38.9
Diphda	348°51.2	-17°52.8
Achernar	335°23.1	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°25.6	89°20.9
Akamar	315°14.6	-40°13.7
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.9
Aldebaran	290°44.0	16°32.9
Rigel	281°07.5	-8°10.8
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°22.0
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.4
Betelgeuse	270°56.2	7°24.5
Canopus	263°53.7	-52°42.4
Sirius	258°29.4	-16°44.4
Adara	255°08.7	-28°59.9
Procyon	244°54.8	5°10.5
Pollux	243°21.9	27°58.6
Avior	234°15.8	-59°34.2
Suhail	222°49.0	-43°30.5
Miaplacidus	221°38.4	-69°47.6
Alphard	217°51.6	-8°44.6
Regulus	207°38.7	11°52.2
Dubhe	193°46.2	61°38.4
Denebola	182°29.1	14°27.7
Gienah	175°47.8	-17°38.9
Acrux	173°04.7	-63°12.1
Gacrux	171°56.2	-57°13.1
Alioth	166°17.1	55°51.0
Spica	158°26.8	-11°15.7
Alcaid	152°55.7	49°12.8
Hadar	148°42.1	-60°27.7
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.1
Rigil Kent.	139°46.3	-60°54.7
Zubenelg.	137°00.8	-16°07.2
Kochab	137°21.1	74°04.4
Alphecca	126°07.6	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.6	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.3
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.4
Deneb	49°28.8	45°21.3
Enif	33°42.9	9°58.0
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°33.9	15°18.8

2019/12/	SHA	Mer.pass
Venus	76°24.0	13:57
Mars	141°13.0	09:37
Jupiter	89°12.7	13:04
Saturn	69°59.0	14:20

2019/12/	SHA	Mer.pass
Venus	75°02.7	13:59
Mars	140°34.0	09:35
Jupiter	88°58.0	13:01
Saturn	69°52.3	14:17

2019/12/	SHA	Mer.pass
Venus	73°41.6	14:00
Mars	139°55.0	09:34
Jupiter	88°43.3	12:58
Saturn	69°45.5	14:13

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°19.8	-22°25.4	70°29.0	16.1	-3°55.8	11.5	54.3
1	197°19.5	-22°25.7	85°04.1	16.1	-3°44.2	11.5	54.3
2	212°19.3	-22°26.0	99°39.2	16.1	-3°32.7	11.6	54.3
3	227°19.0	-22°26.3	114°14.3	16.1	-3°21.1	11.6	54.3
4	242°18.8	-22°26.6	128°49.4	16.1	-3°09.5	11.6	54.3
5	257°18.5	-22°26.9	143°24.5	16.1	-2°57.9	11.6	54.3
6	272°18.2	-22°27.2	157°59.6	16.1	-2°46.3	11.6	54.3
7	287°18.0	-22°27.6	172°34.7	16.1	-2°34.7	11.6	54.3
8	302°17.7	-22°27.9	187°09.8	16.1	-2°23.1	11.7	54.3
9	317°17.5	-22°28.2	201°44.9	16.1	-2°11.4	11.7	54.3
10	332°17.2	-22°28.5	216°20.0	16.1	-1°59.7	11.7	54.3
11	347°16.9	-22°28.8	230°55.1	16.1	-1°48.0	11.7	54.4
12	2°16.7	-22°29.1	245°30.2	16.1	-1°36.3	11.7	54.4
13	17°16.4	-22°29.4	260°05.2	16.1	-1°24.6	11.7	54.4
14	32°16.1	-22°29.7	274°40.3	16.1	-1°12.9	11.7	54.4
15	47°15.9	-22°30.0	289°15.4	16.1	-1°01.2	11.7	54.4
16	62°15.6	-22°30.3	303°50.4	16.0	-0°49.5	11.7	54.4
17	77°15.4	-22°30.6	318°25.5	16.0	-0°37.7	11.7	54.4
18	92°15.1	-22°30.8	333°00.5	16.0	-0°26.0	11.8	54.4
19	107°14.8	-22°31.1	347°35.5	16.0	-0°14.2	11.8	54.4
20	122°14.6	-22°31.4	2°10.5	16.0	-0°02.4	11.8	54.4
21	137°14.3	-22°31.7	16°45.5	16.0	0°09.3	11.8	54.5
22	152°14.0	-22°32.0	31°20.5	16.0	0°21.1	11.8	54.5
23	167°13.8	-22°32.3	45°55.5	16.0	0°32.9	11.8	54.5
	SD.=16.2	d=-0.3			S.D.=14.8		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°13.5	-22°32.6	60°30.4	15.9	0°44.7	11.8	54.5
1	197°13.2	-22°32.9	75°05.4	15.9	0°56.5	11.8	54.5
2	212°13.0	-22°33.2	89°40.3	15.9	1°08.3	11.8	54.5
3	227°12.7	-22°33.5	104°15.2	15.9	1°20.0	11.8	54.5
4	242°12.4	-22°33.8	118°50.0	15.9	1°31.8	11.8	54.5
5	257°12.2	-22°34.1	133°24.9	15.8	1°43.6	11.8	54.6
6	272°11.9	-22°34.3	147°59.7	15.8	1°55.4	11.8	54.6
7	287°11.6	-22°34.6	162°34.5	15.8	2°07.2	11.8	54.6
8	302°11.4	-22°34.9	177°09.3	15.8	2°19.0	11.8	54.6
9	317°11.1	-22°35.2	191°44.1	15.7	2°30.8	11.8	54.6
10	332°10.8	-22°35.5	206°18.8	15.7	2°42.6	11.8	54.6
11	347°10.6	-22°35.8	220°53.5	15.7	2°54.4	11.8	54.6
12	2°10.3	-22°36.0	235°28.2	15.7	3°06.2	11.8	54.7
13	17°10.0	-22°36.3	250°02.9	15.6	3°18.0	11.8	54.7
14	32°09.8	-22°36.6	264°37.5	15.6	3°29.8	11.8	54.7
15	47°09.5	-22°36.9	279°12.1	15.6	3°41.5	11.8	54.7
16	62°09.2	-22°37.2	293°46.7	15.5	3°53.3	11.8	54.7
17	77°09.0	-22°37.4	308°21.2	15.5	4°05.0	11.8	54.7
18	92°08.7	-22°37.7	322°55.7	15.5	4°16.8	11.7	54.8
19	107°08.4	-22°38.0	337°30.1	15.4	4°28.5	11.7	54.8
20	122°08.2	-22°38.3	352°04.6	15.4	4°40.3	11.7	54.8
21	137°07.9	-22°38.5	6°39.0	15.4	4°52.0	11.7	54.8
22	152°07.6	-22°38.8	21°13.3	15.3	5°03.7	11.7	54.8
23	167°07.3	-22°39.1	35°47.6	15.3	5°15.4	11.7	54.8
	SD.=16.2	d=-0.3			S.D.=14.9		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	182°07.1	-22°39.4	50°21.9	15.3	5°27.1	11.7	54.9
1	197°06.8	-22°39.6	64°56.2	15.2	5°38.8	11.7	54.9
2	212°06.5	-22°39.9	79°30.4	15.2	5°50.4	11.7	54.9
3	227°06.3	-22°40.2	94°04.5	15.1	6°02.1	11.6	54.9
4	242°06.0	-22°40.4	108°38.6	15.1	6°13.7	11.6	54.9
5	257°05.7	-22°40.7	123°12.7	15.1	6°25.3	11.6	55.0
6	272°05.4	-22°41.0	137°46.7	15.0	6°36.9	11.6	55.0
7	287°05.2	-22°41.3	152°20.7	15.0	6°48.5	11.6	55.0
8	302°04.9	-22°41.5	166°54.7	14.9	7°00.0	11.6	55.0
9	317°04.6	-22°41.8	181°28.6	14.9	7°11.6	11.5	55.0
10	332°04.4	-22°42.0	196°02.4	14.8	7°23.1	11.5	55.1
11	347°04.1	-22°42.3	210°36.2	14.8	7°34.6	11.5	55.1
12	2°03.8	-22°42.6	225°10.0	14.7	7°46.1	11.5	55.1
13	17°03.5	-22°42.8	239°43.7	14.7	7°57.5	11.4	55.1
14	32°03.3	-22°43.1	254°17.3	14.6	8°09.0	11.4	55.1
15	47°03.0	-22°43.4	268°50.9	14.6	8°20.4	11.4	55.2
16	62°02.7	-22°43.6	283°24.5	14.5	8°31.8	11.4	55.2
17	77°02.4	-22°43.9	297°57.9	14.5	8°43.1	11.3	55.2
18	92°02.2	-22°44.1	312°31.4	14.4	8°54.4	11.3	55.2
19	107°01.9	-22°44.4	327°04.8	14.4	9°05.8	11.3	55.2
20	122°01.6	-22°44.7	341°38.1	14.3	9°17.0	11.3	55.3
21	137°01.4	-22°44.9	356°11.4	14.2	9°28.3	11.2	55.3
22	152°01.1	-22°45.2	10°44.6	14.2	9°39.5	11.2	55.3
23	167°00.8	-22°45.4	25°17.7	14.1	9°50.7	11.2	55.3
	SD.=16.2	d=-0.3			S.D.=15.0		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:05	10:16	–:–	–:–	13:26	15:37
70	07:47	09:28	–:–	–:–	14:14	15:55
68	07:33	08:58	11:16	12:26	14:44	16:09
66	07:21	08:35	10:06	13:37	15:07	16:22
64	07:10	08:17	09:30	14:12	15:25	16:32
62	07:02	08:02	09:05	14:37	15:40	16:41
60	06:54	07:50	08:45	14:57	15:53	16:48
58	06:47	07:39	08:29	15:13	16:04	16:55
56	06:41	07:29	08:15	15:27	16:13	17:02
54	06:35	07:21	08:04	15:39	16:22	17:07
52	06:30	07:13	07:53	15:49	16:30	17:13
50	06:25	07:06	07:44	15:59	16:37	17:18
45	06:14	06:50	07:24	16:18	16:52	17:29
40	06:04	06:38	07:08	16:35	17:05	17:39
35	05:55	06:26	06:54	16:48	17:16	17:48
30	05:47	06:16	06:42	17:00	17:26	17:56
20	05:31	05:58	06:22	17:20	17:44	18:12
10	05:15	05:42	06:04	17:38	18:01	18:27
0	04:59	05:25	05:48	17:55	18:17	18:43
-10	04:41	05:08	05:31	18:12	18:35	19:02
-20	04:19	04:48	05:12	18:30	18:55	19:24
-30	03:51	04:24	04:51	18:51	19:19	19:52
-35	03:33	04:10	04:39	19:04	19:33	20:10
-40	03:11	03:52	04:24	19:18	19:51	20:32
-45	02:42	03:31	04:07	19:36	20:12	21:01
-50	02:00	03:03	03:46	19:57	20:41	21:43
-52	01:36	02:48	03:36	20:08	20:55	22:08
-54	01:01	02:32	03:24	20:19	21:12	22:44
-56	–:–	02:12	03:11	20:33	21:32	–:–
-58	–:–	01:45	02:55	20:48	21:59	–:–
-60	–:–	01:07	02:36	21:07	22:38	–:–

	Moonrise			Moonset		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	13:57	13:40	13:20	00:30	02:15	04:03
70	13:56	13:44	13:32	00:36	02:14	03:54
68	13:54	13:48	13:41	00:40	02:12	03:46
66	13:53	13:51	13:49	00:44	02:11	03:40
64	13:52	13:54	13:55	00:47	02:10	03:35
62	13:51	13:56	14:01	00:50	02:10	03:30
60	13:50	13:58	14:06	00:53	02:09	03:26
58	13:50	13:60	14:11	00:55	02:08	03:23
56	13:49	14:01	14:15	00:57	02:08	03:20
54	13:49	14:03	14:18	00:58	02:07	03:17
52	13:48	14:04	14:22	00:60	02:07	03:15
50	13:48	14:05	14:25	01:01	02:06	03:13
45	13:46	14:08	14:31	01:04	02:06	03:08
40	13:46	14:10	14:36	01:07	02:05	03:04
35	13:45	14:12	14:41	01:09	02:04	03:00
30	13:44	14:14	14:45	01:11	02:04	02:57
20	13:43	14:17	14:53	01:14	02:03	02:52
10	13:42	14:20	14:59	01:17	02:02	02:47
0	13:41	14:23	15:05	01:20	02:01	02:43
-10	13:40	14:25	15:11	01:23	02:00	02:38
-20	13:39	14:28	15:18	01:25	01:59	02:34
-30	13:38	14:31	15:25	01:29	01:58	02:29
-35	13:38	14:33	15:30	01:30	01:58	02:26
-40	13:37	14:35	15:35	01:32	01:57	02:22
-45	13:36	14:38	15:41	01:35	01:56	02:18
-50	13:35	14:41	15:48	01:37	01:55	02:14
-52	13:35	14:42	15:51	01:39	01:55	02:11
-54	13:34	14:43	15:54	01:40	01:54	02:09
-56	13:34	14:45	15:58	01:42	01:54	02:06
-58	13:33	14:47	16:03	01:43	01:53	02:04
-60	13:32	14:49	16:08	01:45	01:53	02:00

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
6	09:19	09:07	11:50	19:51	07:30	10(70%)
7	08:54	08:41	11:51	20:32	08:11	11(79%)
8	08:28	08:15	11:51	21:15	08:53	12(86%)

December 09, 10 ,11 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	77°26.8	149°47.5	-24°07.6	216°42.6	-15°12.0	165°55.4	-23°18.2	147°05.6	-22°02.2
1	92°29.3	164°46.6	-24°07.3	231°43.5	-15°12.5	180°57.3	-23°18.2	162°07.8	-22°02.2
2	107°31.8	179°45.7	-24°06.9	246°44.3	-15°13.0	195°59.1	-23°18.2	177°09.9	-22°02.1
3	122°34.2	194°44.8	-24°06.6	261°45.1	-15°13.6	211°01.0	-23°18.2	192°12.1	-22°02.1
4	137°36.7	209°43.9	-24°06.3	276°45.9	-15°14.1	226°02.8	-23°18.2	207°14.3	-22°02.1
5	152°39.2	224°43.0	-24°06.0	291°46.8	-15°14.6	241°04.7	-23°18.2	222°16.5	-22°02.0
6	167°41.6	239°42.1	-24°05.6	306°47.6	-15°15.1	256°06.5	-23°18.2	237°18.7	-22°02.0
7	182°44.1	254°41.2	-24°05.3	321°48.4	-15°15.6	271°08.4	-23°18.2	252°20.8	-22°02.0
8	197°46.6	269°40.3	-24°05.0	336°49.3	-15°16.1	286°10.2	-23°18.2	267°23.0	-22°01.9
9	212°49.0	284°39.4	-24°04.6	351°50.1	-15°16.7	301°12.1	-23°18.2	282°25.2	-22°01.9
10	227°51.5	299°38.5	-24°04.3	6°50.9	-15°17.2	316°13.9	-23°18.2	297°27.4	-22°01.9
11	242°53.9	314°37.6	-24°04.0	21°51.7	-15°17.7	331°15.8	-23°18.2	312°29.6	-22°01.8
12	257°56.4	329°36.7	-24°03.7	36°52.6	-15°18.2	346°17.6	-23°18.2	327°31.7	-22°01.8
13	272°58.9	344°35.8	-24°03.3	51°53.4	-15°18.7	1°19.5	-23°18.2	342°33.9	-22°01.8
14	288°01.3	359°34.9	-24°03.0	66°54.2	-15°19.3	16°21.3	-23°18.2	357°36.1	-22°01.7
15	303°03.8	14°34.0	-24°02.6	81°55.1	-15°19.8	31°23.2	-23°18.2	12°38.3	-22°01.7
16	318°06.3	29°33.1	-24°02.3	96°55.9	-15°20.3	46°25.0	-23°18.2	27°40.5	-22°01.7
17	333°08.7	44°32.2	-24°02.0	111°56.7	-15°20.8	61°26.9	-23°18.2	42°42.6	-22°01.6
18	348°11.2	59°31.3	-24°01.6	126°57.5	-15°21.3	76°28.7	-23°18.2	57°44.8	-22°01.6
19	3°13.7	74°30.4	-24°01.3	141°58.4	-15°21.8	91°30.6	-23°18.2	72°47.0	-22°01.6
20	18°16.1	89°29.5	-24°00.9	156°59.2	-15°22.4	106°32.4	-23°18.2	87°49.2	-22°01.5
21	33°18.6	104°28.6	-24°00.6	172°00.0	-15°22.9	121°34.3	-23°18.2	102°51.3	-22°01.5
22	48°21.1	119°27.7	-24°00.2	187°00.8	-15°23.4	136°36.1	-23°18.2	117°53.5	-22°01.5
23	63°23.5	134°26.8	-23°59.9	202°01.7	-15°23.9	151°37.9	-23°18.2	132°55.7	-22°01.4
Mer.pass.:18:47		v-0.9 d0.3 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	78°26.0	149°25.9	-23°59.5	217°02.5	-15°24.4	166°39.8	-23°18.2	147°57.9	-22°01.4
1	93°28.4	164°25.0	-23°59.2	232°03.3	-15°24.9	181°41.6	-23°18.1	163°00.1	-22°01.4
2	108°30.9	179°24.1	-23°58.8	247°04.1	-15°25.4	196°43.5	-23°18.1	178°02.2	-22°01.3
3	123°33.4	194°23.2	-23°58.5	262°05.0	-15°26.0	211°45.3	-23°18.1	193°04.4	-22°01.3
4	138°35.8	209°22.3	-23°58.1	277°05.8	-15°26.5	226°47.2	-23°18.1	208°06.6	-22°01.3
5	153°38.3	224°21.4	-23°57.8	292°06.6	-15°27.0	241°49.0	-23°18.1	223°08.8	-22°01.2
6	168°40.8	239°20.5	-23°57.4	307°07.4	-15°27.5	256°50.9	-23°18.1	238°10.9	-22°01.2
7	183°43.2	254°19.6	-23°57.1	322°08.3	-15°28.0	271°52.7	-23°18.1	253°13.1	-22°01.2
8	198°45.7	269°18.7	-23°56.7	337°09.1	-15°28.5	286°54.6	-23°18.1	268°15.3	-22°01.1
9	213°48.2	284°17.9	-23°56.4	352°09.9	-15°29.0	301°56.4	-23°18.1	283°17.5	-22°01.1
10	228°50.6	299°17.0	-23°56.0	7°10.7	-15°29.6	316°58.3	-23°18.1	298°19.7	-22°01.1
11	243°53.1	314°16.1	-23°55.6	22°11.6	-15°30.1	332°00.1	-23°18.1	313°21.8	-22°01.0
12	258°55.6	329°15.2	-23°55.3	37°12.4	-15°30.6	347°02.0	-23°18.1	328°24.0	-22°01.0
13	273°58.0	344°14.3	-23°54.9	52°13.2	-15°31.1	2°03.8	-23°18.1	343°26.2	-22°00.9
14	289°00.5	359°13.4	-23°54.5	67°14.0	-15°31.6	17°05.7	-23°18.1	358°28.4	-22°00.9
15	304°02.9	14°12.5	-23°54.2	82°14.9	-15°32.1	32°07.5	-23°18.1	13°30.5	-22°00.9
16	319°05.4	29°11.6	-23°53.8	97°15.7	-15°32.6	47°09.4	-23°18.1	28°32.7	-22°00.8
17	334°07.9	44°10.7	-23°53.4	112°16.5	-15°33.1	62°11.2	-23°18.1	43°34.9	-22°00.8
18	349°10.3	59°09.8	-23°53.1	127°17.3	-15°33.7	77°13.1	-23°18.1	58°37.1	-22°00.8
19	4°12.8	74°08.9	-23°52.7	142°18.1	-15°34.2	92°14.9	-23°18.1	73°39.3	-22°00.7
20	19°15.3	89°08.1	-23°52.3	157°19.0	-15°34.7	107°16.7	-23°18.1	88°41.4	-22°00.7
21	34°17.7	104°07.2	-23°51.9	172°19.8	-15°35.2	122°18.6	-23°18.1	103°43.6	-22°00.7
22	49°20.2	119°06.3	-23°51.6	187°20.6	-15°35.7	137°20.4	-23°18.1	118°45.8	-22°00.6
23	64°22.7	134°05.4	-23°51.2	202°21.4	-15°36.2	152°22.3	-23°18.1	133°48.0	-22°00.6
Mer.pass.:18:43		v-0.9 d0.4 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	79°25.1	149°04.5	-23°50.8	217°22.3	-15°36.7	167°24.1	-23°18.1	148°50.1	-22°00.6
1	94°27.6	164°03.6	-23°50.4	232°23.1	-15°37.2	182°26.0	-23°18.1	163°52.3	-22°00.5
2	109°30.0	179°02.7	-23°50.0	247°23.9	-15°37.7	197°27.8	-23°18.1	178°54.5	-22°00.5
3	124°32.5	194°01.8	-23°49.7	262°24.7	-15°38.3	212°29.7	-23°18.1	193°56.7	-22°00.5
4	139°35.0	209°01.0	-23°49.3	277°25.5	-15°38.8	227°31.5	-23°18.1	208°58.8	-22°00.4
5	154°37.4	224°00.1	-23°48.9	292°26.4	-15°39.3	242°33.4	-23°18.0	224°01.0	-22°00.4
6	169°39.9	238°59.2	-23°48.5	307°27.2	-15°39.8	257°35.2	-23°18.0	239°03.2	-22°00.4
7	184°42.4	253°58.3	-23°48.1	322°28.0	-15°40.3	272°37.1	-23°18.0	254°05.4	-22°00.3
8	199°44.8	268°57.4	-23°47.7	337°28.8	-15°40.8	287°38.9	-23°18.0	269°07.5	-22°00.3
9	214°47.3	283°56.5	-23°47.3	352°29.6	-15°41.3	302°40.8	-23°18.0	284°09.7	-22°00.3
10	229°49.8	298°55.6	-23°46.9	7°30.5	-15°41.8	317°42.6	-23°18.0	299°11.9	-22°00.2
11	244°52.2	313°54.8	-23°46.6	22°31.3	-15°42.3	332°44.4	-23°18.0	314°14.1	-22°00.2
12	259°54.7	328°53.9	-23°46.2	37°32.1	-15°42.8	347°46.3	-23°18.0	329°16.3	-22°00.2
13	274°57.2	343°53.0	-23°45.8	52°32.9	-15°43.3	2°48.1	-23°18.0	344°18.4	-22°00.1
14	289°59.6	358°52.1	-23°45.4	67°33.7	-15°43.9	17°50.0	-23°18.0	359°20.6	-22°00.1
15	305°02.1	13°51.2	-23°45.0	82°34.6	-15°44.4	32°51.8	-23°18.0	14°22.8	-22°00.1
16	320°04.5	28°50.4	-23°44.6	97°35.4	-15°44.9	47°53.7	-23°18.0	29°25.0	-22°00.0
17	335°07.0	43°49.5	-23°44.2	112°36.2	-15°45.4	62°55.5	-23°18.0	44°27.1	-21°60.0
18	350°09.5	58°48.6	-23°43.8	127°37.0	-15°45.9	77°57.4	-23°18.0	59°29.3	-21°59.9
19	5°11.9	73°47.7	-23°43.4	142°37.8	-15°46.4	92°59.2	-23°18.0	74°31.5	-21°59.9
20	20°14.4	88°46.8	-23°43.0	157°38.6	-15°46.9	108°01.1	-23°18.0	89°33.7	-21°59.9
21	35°16.9	103°45.9	-23°42.6	172°39.5	-15°47.4	123°02.9	-23°18.0	104°35.8	-21°59.8
22	50°19.3	118°45.1	-23°42.2	187°40.3	-15°47.9	138°04.8	-23°18.0	119°38.0	-21°59.8
23	65°21.8	133°44.2	-23°41.8	202°41.1	-15°48.4	153°06.6	-23°18.0	134°40.2	-21°59.8
Mer.pass.:18:39		v-0.9 d0.4 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.8	29°12.1
Ankaa	353°11.1	-42°12.2
Schedar	349°35.3	56°39.0
Diphda	348°51.2	-17°52.8
Achernar	335°23.1	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°26.1	89°21.0
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.9
Aldebaran	290°44.0	16°32.9
Rigel	281°07.4	-8°10.8
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.2	7°24.5
Canopus	263°53.7	-52°42.4
Sirius	258°29.4	-16°44.5
Adara	255°08.7	-28°59.9
Procyon	244°54.7	5°10.5
Pollux	243°21.9	27°58.5
Avior	234°15.8	-59°34.2
Suhail	222°49.0	-43°30.5
Miaplacidus	221°38.3	-69°47.6
Alphard	217°51.6	-8°44.6
Regulus	207°38.7	11°52.2
Dubhe	193°46.2	61°38.4
Denebola	182°29.1	14°27.7
Gienah	175°47.8	-17°38.9
Acrux	173°04.6	-63°12.1
Gacrux	171°56.2	-57°13.1
Alioth	166°17.1	55°51.0
Spica	158°26.8	-11°15.7
Alcaid	152°55.7	49°12.8
Hadar	148°42.1	-60°27.7
Menkent	148°02.7	-36°27.7
Arcturus	145°51.8	19°05.1
Rigil Kent.	139°46.3	-60°54.7
Zubenelg.	137°00.8	-16°07.2
Kochab	137°21.0	74°04.4
Alphecca	126°07.6	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.6	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.3
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.4
Deneb	49°28.8	45°21.3
Enif	33°42.9	9°58.0
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.1	28°11.5
Markab	13°34.0	15°18.8

2019/12/	SHA	Mer.pass
Venus	72°20.7	14:02
Mars	139°15.8	09:33
Jupiter	88°28.6	12:55
Saturn	69°38.7	14:10

2019/12/	SHA	Mer.pass
Venus	70°59.9	14:03
Mars	138°36.5	09:31
Jupiter	88°13.8	12:52
Saturn	69°31.9	14:06

2019/12/	SHA	Mer.pass
Venus	69°39.4	14:05
Mars	137°57.1	09:30
Jupiter	87°59.0	12:49
Saturn	69°25.0	14:03

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	182°00.5	-22°45.7	39°50.8	14.1	10°01.8	11.1	55.4
1	197°00.3	-22°45.9	54°23.9	14.0	10°12.9	11.1	55.4
2	211°60.0	-22°46.2	68°56.8	13.9	10°24.0	11.1	55.4
3	226°59.7	-22°46.4	83°29.7	13.9	10°35.1	11.0	55.4
4	241°59.4	-22°46.7	98°02.6	13.8	10°46.1	11.0	55.4
5	256°59.1	-22°46.9	112°35.4	13.8	10°57.1	11.0	55.5
6	271°58.9	-22°47.2	127°08.1	13.7	11°08.0	10.9	55.5
7	286°58.6	-22°47.4	141°40.8	13.6	11°18.9	10.9	55.5
8	301°58.3	-22°47.7	156°13.4	13.6	11°29.8	10.8	55.5
9	316°58.0	-22°47.9	170°45.9	13.5	11°40.6	10.8	55.6
10	331°57.8	-22°48.2	185°18.4	13.4	11°51.4	10.8	55.6
11	346°57.5	-22°48.4	199°50.7	13.4	12°02.1	10.7	55.6
12	1°57.2	-22°48.7	214°23.1	13.3	12°12.8	10.7	55.6
13	16°56.9	-22°48.9	228°55.3	13.2	12°23.4	10.6	55.7
14	31°56.7	-22°49.2	243°27.5	13.2	12°34.0	10.6	55.7
15	46°56.4	-22°49.4	257°59.6	13.1	12°44.6	10.5	55.7
16	61°56.1	-22°49.6	272°31.7	13.0	12°55.1	10.5	55.7
17	76°55.8	-22°49.9	287°03.7	12.9	13°05.6	10.4	55.8
18	91°55.5	-22°50.1	301°35.6	12.9	13°16.0	10.4	55.8
19	106°55.3	-22°50.4	316°07.4	12.8	13°26.3	10.3	55.8
20	121°55.0	-22°50.6	330°39.2	12.7	13°36.6	10.3	55.8
21	136°54.7	-22°50.8	345°10.8	12.6	13°46.9	10.2	55.8
22	151°54.4	-22°51.1	359°42.4	12.6	13°57.1	10.2	55.9
23	166°54.1	-22°51.3	14°14.0	12.5	14°07.2	10.1	55.9
	SD.=16.2	d=-0.3			S.D.=15.1		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°53.9	-22°51.5	28°45.4	12.4	14°17.3	10.1	55.9
1	196°53.6	-22°51.8	43°16.8	12.3	14°27.4	10.0	55.9
2	211°53.3	-22°52.0	57°48.1	12.3	14°37.3	9.9	56.0
3	226°53.0	-22°52.2	72°19.4	12.2	14°47.2	9.9	56.0
4	241°52.7	-22°52.5	86°50.5	12.1	14°57.1	9.8	56.0
5	256°52.5	-22°52.7	101°21.6	12.0	15°06.9	9.8	56.0
6	271°52.2	-22°52.9	115°52.6	12.0	15°16.6	9.7	56.1
7	286°51.9	-22°53.2	130°23.5	11.9	15°26.3	9.6	56.1
8	301°51.6	-22°53.4	144°54.3	11.8	15°35.9	9.6	56.1
9	316°51.3	-22°53.6	159°25.1	11.7	15°45.4	9.5	56.1
10	331°51.1	-22°53.9	173°55.8	11.6	15°54.9	9.4	56.2
11	346°50.8	-22°54.1	188°26.4	11.6	16°04.3	9.4	56.2
12	1°50.5	-22°54.3	202°56.9	11.5	16°13.6	9.3	56.2
13	16°50.2	-22°54.5	217°27.3	11.4	16°22.9	9.2	56.3
14	31°49.9	-22°54.8	231°57.7	11.3	16°32.1	9.1	56.3
15	46°49.7	-22°55.0	246°28.0	11.2	16°41.2	9.1	56.3
16	61°49.4	-22°55.2	260°58.1	11.1	16°50.2	9.0	56.3
17	76°49.1	-22°55.4	275°28.3	11.1	16°59.2	8.9	56.4
18	91°48.8	-22°55.6	289°58.3	11.0	17°08.1	8.8	56.4
19	106°48.5	-22°55.9	304°28.2	10.9	17°16.9	8.8	56.4
20	121°48.2	-22°56.1	318°58.1	10.8	17°25.6	8.7	56.4
21	136°48.0	-22°56.3	333°27.9	10.7	17°34.2	8.6	56.5
22	151°47.7	-22°56.5	347°57.5	10.7	17°42.8	8.5	56.5
23	166°47.4	-22°56.7	2°27.2	10.6	17°51.3	8.4	56.5
	SD.=16.2	d=-0.2			S.D.=15.3		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	181°47.1	-22°57.0	16°56.7	10.5	17°59.7	8.4	56.5
1	196°46.8	-22°57.2	31°26.1	10.4	18°08.0	8.3	56.6
2	211°46.5	-22°57.4	45°55.5	10.3	18°16.3	8.2	56.6
3	226°46.2	-22°57.6	60°24.8	10.2	18°24.4	8.1	56.6
4	241°46.0	-22°57.8	74°54.0	10.2	18°32.5	8.0	56.6
5	256°45.7	-22°58.0	89°23.1	10.1	18°40.4	7.9	56.7
6	271°45.4	-22°58.2	103°52.1	10.0	18°48.3	7.8	56.7
7	286°45.1	-22°58.5	118°21.0	9.9	18°56.1	7.7	56.7
8	301°44.8	-22°58.7	132°49.9	9.8	19°03.8	7.6	56.7
9	316°44.5	-22°58.9	147°18.7	9.7	19°11.4	7.5	56.8
10	331°44.3	-22°59.1	161°47.4	9.7	19°18.9	7.5	56.8
11	346°44.0	-22°59.3	176°16.0	9.6	19°26.3	7.4	56.8
12	1°43.7	-22°59.5	190°44.5	9.5	19°33.6	7.3	56.8
13	16°43.4	-22°59.7	205°13.0	9.4	19°40.8	7.2	56.9
14	31°43.1	-22°59.9	219°41.3	9.3	19°47.9	7.1	56.9
15	46°42.8	-23°00.1	234°09.6	9.2	19°54.9	7.0	56.9
16	61°42.5	-23°00.3	248°37.8	9.2	20°01.8	6.9	56.9
17	76°42.2	-23°00.5	263°05.9	9.1	20°08.6	6.7	57.0
18	91°42.0	-23°00.7	277°34.0	9.0	20°15.3	6.6	57.0
19	106°41.7	-23°00.9	292°01.9	8.9	20°21.9	6.5	57.0
20	121°41.4	-23°01.1	306°29.8	8.8	20°28.4	6.4	57.0
21	136°41.1	-23°01.3	320°57.6	8.8	20°34.7	6.3	57.1
22	151°40.8	-23°01.5	335°25.3	8.7	20°41.0	6.2	57.1
23	166°40.5	-23°01.7	349°53.0	8.6	20°47.1	6.1	57.1
	SD.=16.2	d=-0.2			S.D.=15.4		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:11	10:28	–:–	–:–	13:17	15:33
70	07:53	09:36	–:–	–:–	14:08	15:52
68	07:38	09:04	–:–	–:–	14:41	16:07
66	07:25	08:41	10:15	13:30	15:04	16:20
64	07:15	08:22	09:37	14:08	15:23	16:30
62	07:06	08:07	09:11	14:34	15:38	16:39
60	06:58	07:54	08:50	14:55	15:51	16:47
58	06:50	07:43	08:34	15:12	16:02	16:55
56	06:44	07:33	08:19	15:26	16:12	17:01
54	06:38	07:24	08:07	15:38	16:21	17:07
52	06:33	07:16	07:56	15:49	16:29	17:12
50	06:28	07:09	07:47	15:58	16:36	17:18
45	06:16	06:53	07:27	16:18	16:52	17:29
40	06:06	06:40	07:10	16:35	17:05	17:39
35	05:57	06:29	06:57	16:48	17:16	17:48
30	05:49	06:18	06:45	17:01	17:27	17:57
20	05:33	06:00	06:24	17:21	17:45	18:13
10	05:17	05:43	06:06	17:39	18:02	18:28
0	05:00	05:26	05:49	17:56	18:19	18:45
-10	04:42	05:09	05:32	18:14	18:37	19:04
-20	04:20	04:49	05:13	18:32	18:57	19:26
-30	03:51	04:25	04:52	18:54	19:21	19:54
-35	03:33	04:10	04:39	19:06	19:36	20:12
-40	03:11	03:52	04:24	19:21	19:54	20:35
-45	02:41	03:30	04:07	19:39	20:16	21:05
-50	01:58	03:01	03:45	20:01	20:44	21:48
-52	01:33	02:47	03:35	20:11	20:59	22:14
-54	00:54	02:30	03:23	20:23	21:16	22:54
-56	–:–	02:09	03:09	20:37	21:37	–:–
-58	–:–	01:42	02:53	20:53	22:05	–:–
-60	–:–	00:60	02:34	21:12	22:48	–:–

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	12:56	12:16	–:–	05:59	08:16	–:–
70	13:17	12:57	12:13	05:39	07:37	10:06
68	13:34	13:25	13:13	05:24	07:10	09:07
66	13:47	13:46	13:48	05:12	06:50	08:33
64	13:58	14:04	14:13	05:02	06:33	08:08
62	14:08	14:18	14:33	04:54	06:20	07:49
60	14:16	14:30	14:49	04:46	06:09	07:33
58	14:24	14:40	15:03	04:40	05:59	07:20
56	14:30	14:49	15:15	04:34	05:51	07:08
54	14:36	14:58	15:25	04:29	05:43	06:58
52	14:41	15:05	15:35	04:25	05:36	06:49
50	14:46	15:11	15:43	04:20	05:30	06:41
45	14:56	15:26	16:01	04:12	05:17	06:25
40	15:05	15:37	16:15	04:04	05:07	06:11
35	15:12	15:47	16:28	03:58	04:57	05:59
30	15:19	15:56	16:39	03:52	04:49	05:49
20	15:30	16:12	16:57	03:43	04:36	05:31
10	15:41	16:25	17:14	03:34	04:24	05:16
0	15:50	16:38	17:29	03:26	04:13	05:02
-10	15:60	16:51	17:45	03:19	04:01	04:48
-20	16:10	17:04	18:01	03:10	03:50	04:33
-30	16:22	17:20	18:20	03:01	03:36	04:16
-35	16:29	17:29	18:32	02:55	03:28	04:06
-40	16:36	17:40	18:45	02:49	03:19	03:54
-45	16:46	17:52	18:60	02:42	03:09	03:41
-50	16:57	18:07	19:19	02:33	02:57	03:25
-52	17:02	18:15	19:28	02:30	02:51	03:17
-54	17:08	18:23	19:38	02:25	02:44	03:09
-56	17:14	18:31	19:49	02:20	02:37	02:59
-58	17:21	18:42	20:02	02:15	02:29	02:48
-60	17:29	18:53	20:17	02:09	02:21	02:36

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
9	08:02	07:49	11:52	22:01	09:38	13(92%)
10	07:36	07:22	11:52	22:49	10:25	14(97%)
11	07:09	06:55	11:53	23:41	11:15	15(99%)

December 12, 13 ,14 (Thu., Fri., Sat.)

	Aries	Venus		Mars		Jupiter		Saturn	
Thu	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	80°24.3	148°43.3	-23°41.3	217°41.9	-15°48.9	168°08.4	-23°18.0	149°42.4	-21°59.7
1	95°26.7	163°42.4	-23°40.9	232°42.7	-15°49.4	183°10.3	-23°18.0	164°44.5	-21°59.7
2	110°29.2	178°41.6	-23°40.5	247°43.6	-15°49.9	198°12.1	-23°18.0	179°46.7	-21°59.7
3	125°31.7	193°40.7	-23°40.1	262°44.4	-15°50.4	213°14.0	-23°17.9	194°48.9	-21°59.6
4	140°34.1	208°39.8	-23°39.7	277°45.2	-15°50.9	228°15.8	-23°17.9	209°51.1	-21°59.6
5	155°36.6	223°38.9	-23°39.3	292°46.0	-15°51.5	243°17.7	-23°17.9	224°53.2	-21°59.6
6	170°39.0	238°38.1	-23°38.9	307°46.8	-15°52.0	258°19.5	-23°17.9	239°55.4	-21°59.5
7	185°41.5	253°37.2	-23°38.5	322°47.6	-15°52.5	273°21.4	-23°17.9	254°57.6	-21°59.5
8	200°44.0	268°36.3	-23°38.0	337°48.5	-15°53.0	288°23.2	-23°17.9	269°59.8	-21°59.5
9	215°46.4	283°35.4	-23°37.6	352°49.3	-15°53.5	303°25.1	-23°17.9	285°01.9	-21°59.4
10	230°48.9	298°34.6	-23°37.2	7°50.1	-15°54.0	318°26.9	-23°17.9	300°04.1	-21°59.4
11	245°51.4	313°33.7	-23°36.8	22°50.9	-15°54.5	333°28.8	-23°17.9	315°06.3	-21°59.4
12	260°53.8	328°32.8	-23°36.4	37°51.7	-15°55.0	348°30.6	-23°17.9	330°08.5	-21°59.3
13	275°56.3	343°31.9	-23°35.9	52°52.5	-15°55.5	3°32.4	-23°17.9	345°10.6	-21°59.3
14	290°58.8	358°31.1	-23°35.5	67°53.3	-15°56.0	18°34.3	-23°17.9	0°12.8	-21°59.2
15	306°01.2	13°30.2	-23°35.1	82°54.2	-15°56.5	33°36.1	-23°17.9	15°15.0	-21°59.2
16	321°03.7	28°29.3	-23°34.6	97°55.0	-15°57.0	48°38.0	-23°17.9	30°17.1	-21°59.2
17	336°06.2	43°28.4	-23°34.2	112°55.8	-15°57.5	63°39.8	-23°17.9	45°19.3	-21°59.1
18	351°08.6	58°27.6	-23°33.8	127°56.6	-15°58.0	78°41.7	-23°17.9	60°21.5	-21°59.1
19	6°11.1	73°26.7	-23°33.4	142°57.4	-15°58.5	93°43.5	-23°17.9	75°23.7	-21°59.1
20	21°13.5	88°25.8	-23°32.9	157°58.2	-15°59.0	108°45.4	-23°17.9	90°25.8	-21°59.0
21	36°16.0	103°25.0	-23°32.5	172°59.0	-15°59.5	123°47.2	-23°17.9	105°28.0	-21°59.0
22	51°18.5	118°24.1	-23°32.1	187°59.9	-16°00.0	138°49.0	-23°17.8	120°30.2	-21°59.0
23	66°20.9	133°23.2	-23°31.6	203°00.7	-16°00.5	153°50.9	-23°17.8	135°32.4	-21°58.9
Mer.pass.:18:35		v-0.9 d0.4 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	81°23.4	148°22.4	-23°31.2	218°01.5	-16°01.0	168°52.7	-23°17.8	150°34.5	-21°58.9
1	96°25.9	163°21.5	-23°30.7	233°02.3	-16°01.5	183°54.6	-23°17.8	165°36.7	-21°58.9
2	111°28.3	178°20.6	-23°30.3	248°03.1	-16°02.0	198°56.4	-23°17.8	180°38.9	-21°58.8
3	126°30.8	193°19.8	-23°29.9	263°03.9	-16°02.5	213°58.3	-23°17.8	195°41.1	-21°58.8
4	141°33.3	208°18.9	-23°29.4	278°04.7	-16°03.0	229°00.1	-23°17.8	210°43.2	-21°58.8
5	156°35.7	223°18.0	-23°29.0	293°05.5	-16°03.5	244°02.0	-23°17.8	225°45.4	-21°58.7
6	171°38.2	238°17.2	-23°28.5	308°06.4	-16°04.0	259°03.8	-23°17.8	240°47.6	-21°58.7
7	186°40.7	253°16.3	-23°28.1	323°07.2	-16°04.5	274°05.7	-23°17.8	255°49.7	-21°58.6
8	201°43.1	268°15.4	-23°27.6	338°08.0	-16°05.0	289°07.5	-23°17.8	270°51.9	-21°58.6
9	216°45.6	283°14.6	-23°27.2	353°08.8	-16°05.5	304°09.3	-23°17.8	285°54.1	-21°58.6
10	231°48.0	298°13.7	-23°26.7	8°09.6	-16°06.0	319°11.2	-23°17.8	300°56.3	-21°58.5
11	246°50.5	313°12.8	-23°26.3	23°10.4	-16°06.5	334°13.0	-23°17.8	315°58.4	-21°58.5
12	261°53.0	328°12.0	-23°25.8	38°11.2	-16°07.0	349°14.9	-23°17.8	331°00.6	-21°58.5
13	276°55.4	343°11.1	-23°25.4	53°12.0	-16°07.5	4°16.7	-23°17.8	346°02.8	-21°58.4
14	291°57.9	358°10.2	-23°24.9	68°12.8	-16°08.0	19°18.6	-23°17.7	1°05.0	-21°58.4
15	307°00.4	13°09.4	-23°24.5	83°13.7	-16°08.5	34°20.4	-23°17.7	16°07.1	-21°58.4
16	322°02.8	28°08.5	-23°24.0	98°14.5	-16°09.0	49°22.2	-23°17.7	31°09.3	-21°58.3
17	337°05.3	43°07.7	-23°23.6	113°15.3	-16°09.5	64°24.1	-23°17.7	46°11.5	-21°58.3
18	352°07.8	58°06.8	-23°23.1	128°16.1	-16°10.0	79°25.9	-23°17.7	61°13.6	-21°58.3
19	7°10.2	73°05.9	-23°22.6	143°16.9	-16°10.5	94°27.8	-23°17.7	76°15.8	-21°58.2
20	22°12.7	88°05.1	-23°22.2	158°17.7	-16°11.0	109°29.6	-23°17.7	91°18.0	-21°58.2
21	37°15.2	103°04.2	-23°21.7	173°18.5	-16°11.5	124°31.5	-23°17.7	106°20.2	-21°58.1
22	52°17.6	118°03.4	-23°21.2	188°19.3	-16°12.0	139°33.3	-23°17.7	121°22.3	-21°58.1
23	67°20.1	133°02.5	-23°20.8	203°20.1	-16°12.5	154°35.2	-23°17.7	136°24.5	-21°58.1
Mer.pass.:18:31		v-0.9 d0.4 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	82°22.5	148°01.6	-23°20.3	218°20.9	-16°13.0	169°37.0	-23°17.7	151°26.7	-21°58.0
1	97°25.0	163°00.8	-23°19.9	233°21.8	-16°13.5	184°38.8	-23°17.7	166°28.8	-21°58.0
2	112°27.5	177°59.9	-23°19.4	248°22.6	-16°14.0	199°40.7	-23°17.7	181°31.0	-21°58.0
3	127°29.9	192°59.1	-23°18.9	263°23.4	-16°14.5	214°42.5	-23°17.7	196°33.2	-21°57.9
4	142°32.4	207°58.2	-23°18.4	278°24.2	-16°15.0	229°44.4	-23°17.7	211°35.4	-21°57.9
5	157°34.9	222°57.4	-23°18.0	293°25.0	-16°15.5	244°46.2	-23°17.6	226°37.5	-21°57.9
6	172°37.3	237°56.5	-23°17.5	308°25.8	-16°16.0	259°48.1	-23°17.6	241°39.7	-21°57.8
7	187°39.8	252°55.7	-23°17.0	323°26.6	-16°16.5	274°49.9	-23°17.6	256°41.9	-21°57.8
8	202°42.3	267°54.8	-23°16.5	338°27.4	-16°16.9	289°51.8	-23°17.6	271°44.0	-21°57.8
9	217°44.7	282°53.9	-23°16.1	353°28.2	-16°17.4	304°53.6	-23°17.6	286°46.2	-21°57.7
10	232°47.2	297°53.1	-23°15.6	8°29.0	-16°17.9	319°55.4	-23°17.6	301°48.4	-21°57.7
11	247°49.6	312°52.2	-23°15.1	23°29.8	-16°18.4	334°57.3	-23°17.6	316°50.6	-21°57.6
12	262°52.1	327°51.4	-23°14.6	38°30.6	-16°18.9	349°59.1	-23°17.6	331°52.7	-21°57.6
13	277°54.6	342°50.5	-23°14.1	53°31.4	-16°19.4	5°01.0	-23°17.6	346°54.9	-21°57.6
14	292°57.0	357°49.7	-23°13.7	68°32.2	-16°19.9	20°02.8	-23°17.6	1°57.1	-21°57.5
15	307°59.5	12°48.8	-23°13.2	83°33.1	-16°20.4	35°04.7	-23°17.6	16°59.2	-21°57.5
16	323°02.0	27°48.0	-23°12.7	98°33.9	-16°20.9	50°06.5	-23°17.6	32°01.4	-21°57.5
17	338°04.4	42°47.1	-23°12.2	113°34.7	-16°21.4	65°08.3	-23°17.6	47°03.6	-21°57.4
18	353°06.9	57°46.3	-23°11.7	128°35.5	-16°21.9	80°10.2	-23°17.6	62°05.8	-21°57.4
19	8°09.4	72°45.4	-23°11.2	143°36.3	-16°22.4	95°12.0	-23°17.5	77°07.9	-21°57.4
20	23°11.8	87°44.6	-23°10.7	158°37.1	-16°22.9	110°13.9	-23°17.5	92°10.1	-21°57.3
21	38°14.3	102°43.7	-23°10.2	173°37.9	-16°23.4	125°15.7	-23°17.5	107°12.3	-21°57.3
22	53°16.8	117°42.9	-23°09.8	188°38.7	-16°23.9	140°17.6	-23°17.5	122°14.4	-21°57.3
23	68°19.2	132°42.0	-23°09.3	203°39.5	-16°24.3	155°19.4	-23°17.5	137°16.6	-21°57.2
Mer.pass.:18:27		v-0.9 d0.5 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°38.9	29°12.1
Ankaa	353°11.2	-42°12.2
Schedar	349°35.3	56°39.0
Diphda	348°51.2	-17°52.8
Achernar	335°23.1	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°26.5	89°21.0
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.9
Aldebaran	290°43.9	16°32.9
Rigel	281°07.4	-8°10.8
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.2	7°24.5
Canopus	263°53.6	-52°42.4
Sirius	258°29.4	-16°44.5
Adara	255°08.7	-28°60.0
Procyon	244°54.7	5°10.5
Pollux	243°21.9	27°58.5
Avior	234°15.8	-59°34.2
Suhail	222°48.9	-43°30.6
Miaplacidus	221°38.3	-69°47.6
Alphard	217°51.6	-8°44.6
Regulus	207°38.6	11°52.2
Dubhe	193°46.1	61°38.4
Denebola	182°29.1	14°27.7
Gienah	175°47.8	-17°38.9
Acrux	173°04.6	-63°12.1
Gacrux	171°56.1	-57°13.1
Alioth	166°17.0	55°51.0
Spica	158°26.7	-11°15.7
Alcaid	152°55.7	49°12.8
Hadar	148°42.0	-60°27.7
Menkent	148°02.6	-36°27.7
Arcturus	145°51.8	19°05.1
Rigil Kent.	139°46.2	-60°54.7
Zubenelg.	137°00.8	-16°07.2
Kochab	137°21.0	74°04.3
Alphecca	126°07.6	26°39.0
Antares	112°21.2	-26°28.3
Atria	107°19.6	-69°03.6
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.3
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.3
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.4
Deneb	49°28.8	45°21.3
Enif	33°42.9	9°58.0
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.2	28°11.5
Markab	13°34.0	15°18.8

2019/12/	**SHA**	**Mer.pass**
Venus	68°19.1	14:06
Mars	137°17.7	09:29
Jupiter	87°44.2	12:46
Saturn	69°18.1	13:59

2019/12/	**SHA**	**Mer.pass**
Venus	66°59.0	14:07
Mars	136°38.1	09:27
Jupiter	87°29.3	12:43
Saturn	69°11.1	13:56

2019/12/	**SHA**	**Mer.pass**
Venus	65°39.1	14:09
Mars	135°58.4	09:26
Jupiter	87°14.5	12:40
Saturn	69°04.1	13:52

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	181°40.2	-23°01.9	4°20.5	8.5	20°53.2	6.0	57.1
1	196°39.9	-23°02.1	18°48.0	8.5	20°59.1	5.9	57.2
2	211°39.7	-23°02.3	33°15.4	8.4	21°04.9	5.8	57.2
3	226°39.4	-23°02.5	47°42.8	8.3	21°10.6	5.6	57.2
4	241°39.1	-23°02.7	62°10.0	8.2	21°16.2	5.5	57.2
5	256°38.8	-23°02.9	76°37.2	8.2	21°21.7	5.4	57.3
6	271°38.5	-23°03.1	91°04.4	8.1	21°27.0	5.3	57.3
7	286°38.2	-23°03.3	105°31.4	8.0	21°32.2	5.2	57.3
8	301°37.9	-23°03.5	119°58.4	7.9	21°37.3	5.0	57.3
9	316°37.6	-23°03.7	134°25.3	7.9	21°42.3	4.9	57.4
10	331°37.3	-23°03.9	148°52.1	7.8	21°47.2	4.8	57.4
11	346°37.1	-23°04.0	163°18.9	7.7	21°51.9	4.7	57.4
12	1°36.8	-23°04.2	177°45.6	7.7	21°56.5	4.6	57.4
13	16°36.5	-23°04.4	192°12.2	7.6	22°01.0	4.4	57.5
14	31°36.2	-23°04.6	206°38.7	7.5	22°05.4	4.3	57.5
15	46°35.9	-23°04.8	221°05.2	7.5	22°09.6	4.2	57.5
16	61°35.6	-23°05.0	235°31.7	7.4	22°13.7	4.0	57.5
17	76°35.3	-23°05.2	249°58.0	7.3	22°17.7	3.9	57.5
18	91°35.0	-23°05.3	264°24.3	7.3	22°21.6	3.8	57.6
19	106°34.7	-23°05.5	278°50.6	7.2	22°25.3	3.7	57.6
20	121°34.4	-23°05.7	293°16.8	7.2	22°28.9	3.5	57.6
21	136°34.2	-23°05.9	307°42.9	7.1	22°32.3	3.4	57.6
22	151°33.9	-23°06.1	322°09.0	7.0	22°35.6	3.3	57.7
23	166°33.6	-23°06.3	336°35.0	7.0	22°38.8	3.1	57.7
	SD.=16.2	d=-0.2			S.D.=15.6		

Fri	GHA	Dec	GHA	ν	Dec	d	HP
0	181°33.3	-23°06.4	351°00.9	6.9	22°41.9	3.0	57.7
1	196°33.0	-23°06.6	5°26.8	6.9	22°44.8	2.8	57.7
2	211°32.7	-23°06.8	19°52.7	6.8	22°47.6	2.7	57.8
3	226°32.4	-23°07.0	34°18.5	6.8	22°50.2	2.6	57.8
4	241°32.1	-23°07.1	48°44.2	6.7	22°52.7	2.4	57.8
5	256°31.8	-23°07.3	63°09.9	6.7	22°55.1	2.3	57.8
6	271°31.5	-23°07.5	77°35.6	6.6	22°57.3	2.2	57.8
7	286°31.2	-23°07.7	92°01.2	6.6	22°59.4	2.0	57.9
8	301°30.9	-23°07.8	106°26.8	6.5	23°01.3	1.9	57.9
9	316°30.6	-23°08.0	120°52.3	6.5	23°03.1	1.7	57.9
10	331°30.4	-23°08.2	135°17.8	6.5	23°04.8	1.6	57.9
11	346°30.1	-23°08.3	149°43.2	6.4	23°06.3	1.4	57.9
12	1°29.8	-23°08.5	164°08.6	6.4	23°07.7	1.3	58.0
13	16°29.5	-23°08.7	178°34.0	6.3	23°08.9	1.2	58.0
14	31°29.2	-23°08.8	192°59.3	6.3	23°10.0	1.0	58.0
15	46°28.9	-23°09.0	207°24.6	6.3	23°11.0	0.9	58.0
16	61°28.6	-23°09.2	221°49.9	6.3	23°11.8	0.7	58.0
17	76°28.3	-23°09.3	236°15.1	6.2	23°12.4	0.6	58.1
18	91°28.0	-23°09.5	250°40.3	6.2	23°12.9	0.4	58.1
19	106°27.7	-23°09.7	265°05.5	6.2	23°13.3	0.3	58.1
20	121°27.4	-23°09.8	279°30.6	6.1	23°13.5	0.1	58.1
21	136°27.1	-23°10.0	293°55.8	6.1	23°13.6	-0.0	58.1
22	151°26.8	-23°10.2	308°20.9	6.1	23°13.5	-0.2	58.2
23	166°26.5	-23°10.3	322°46.0	6.1	23°13.3	-0.3	58.2
	SD.=16.2	d=-0.2			S.D.=15.7		

Sat	GHA	Dec	GHA	ν	Dec	d	HP
0	181°26.2	-23°10.5	337°11.0	6.1	23°12.9	-0.4	58.2
1	196°25.9	-23°10.6	351°36.1	6.0	23°12.4	-0.6	58.2
2	211°25.6	-23°10.8	6°01.1	6.0	23°11.7	-0.7	58.2
3	226°25.3	-23°11.0	20°26.1	6.0	23°10.9	-0.9	58.3
4	241°25.1	-23°11.1	34°51.1	6.0	23°09.9	-1.0	58.3
5	256°24.8	-23°11.3	49°16.1	6.0	23°08.8	-1.2	58.3
6	271°24.5	-23°11.4	63°41.1	6.0	23°07.5	-1.3	58.3
7	286°24.2	-23°11.6	78°06.1	6.0	23°06.1	-1.5	58.3
8	301°23.9	-23°11.7	92°31.1	6.0	23°04.6	-1.6	58.3
9	316°23.6	-23°11.9	106°56.0	6.0	23°02.9	-1.8	58.4
10	331°23.3	-23°12.0	121°21.0	6.0	23°01.0	-1.9	58.4
11	346°23.0	-23°12.2	135°46.0	6.0	22°59.0	-2.1	58.4
12	1°22.7	-23°12.3	150°10.9	6.0	22°56.9	-2.2	58.4
13	16°22.4	-23°12.5	164°35.9	6.0	22°54.6	-2.4	58.4
14	31°22.1	-23°12.6	179°00.9	6.0	22°52.1	-2.5	58.4
15	46°21.8	-23°12.8	193°25.8	6.0	22°49.5	-2.7	58.5
16	61°21.5	-23°12.9	207°50.8	6.0	22°46.8	-2.8	58.5
17	76°21.2	-23°13.1	222°15.8	6.0	22°43.9	-3.0	58.5
18	91°20.9	-23°13.2	236°40.8	6.0	22°40.9	-3.1	58.5
19	106°20.6	-23°13.4	251°05.8	6.0	22°37.7	-3.3	58.5
20	121°20.3	-23°13.5	265°30.8	6.0	22°34.4	-3.4	58.5
21	136°20.0	-23°13.6	279°55.9	6.0	22°30.9	-3.5	58.6
22	151°19.7	-23°13.8	294°20.9	6.1	22°27.3	-3.7	58.6
23	166°19.4	-23°13.9	308°46.0	6.1	22°23.5	-3.8	58.6
	SD.=16.2	d=-0.2			S.D.=15.9		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:17	10:39	–:–	–:–	13:08	15:31
70	07:57	09:43	–:–	–:–	14:04	15:50
68	07:42	09:10	–:–	–:–	14:38	16:06
66	07:29	08:45	10:22	13:26	15:02	16:19
64	07:18	08:26	09:42	14:05	15:22	16:29
62	07:09	08:11	09:15	14:33	15:37	16:39
60	07:01	07:57	08:54	14:53	15:51	16:47
58	06:53	07:46	08:37	15:11	16:02	16:54
56	06:47	07:36	08:23	15:25	16:12	17:01
54	06:41	07:27	08:10	15:37	16:21	17:07
52	06:35	07:19	07:60	15:48	16:29	17:13
50	06:30	07:12	07:50	15:58	16:36	17:18
45	06:19	06:56	07:29	16:18	16:52	17:29
40	06:08	06:42	07:13	16:35	17:06	17:40
35	05:59	06:31	06:59	16:49	17:17	17:49
30	05:51	06:20	06:47	17:01	17:28	17:57
20	05:34	06:02	06:26	17:22	17:46	18:14
10	05:18	05:45	06:07	17:41	18:03	18:30
0	05:02	05:28	05:50	17:58	18:20	18:46
-10	04:43	05:10	05:33	18:15	18:38	19:05
-20	04:21	04:50	05:14	18:34	18:58	19:28
-30	03:52	04:25	04:52	18:56	19:23	19:56
-35	03:33	04:10	04:40	19:09	19:38	20:15
-40	03:11	03:52	04:25	19:23	19:56	20:38
-45	02:41	03:30	04:07	19:41	20:18	21:08
-50	01:56	03:01	03:45	20:03	20:48	21:52
-52	01:30	02:46	03:34	20:14	21:03	22:19
-54	00:48	02:29	03:22	20:26	21:20	23:02
-56	–:–	02:07	03:08	20:40	21:42	–:–
-58	–:–	01:39	02:52	20:57	22:11	–:–
-60	–:–	00:53	02:32	21:17	22:57	–:–

Lat.	Moonrise			Moonset		
	Thu	Fri	Sat	Thu	Fri	Sat
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	–:–	–:–	–:–	–:–
68	12:37	–:–	–:–	11:34	–:–	–:–
66	13:54	14:18	15:29	10:18	11:53	12:43
64	14:31	15:08	16:14	09:41	11:03	11:57
62	14:57	15:39	16:44	09:15	10:31	11:27
60	15:18	16:03	17:07	08:55	10:08	11:04
58	15:35	16:22	17:25	08:38	09:49	10:46
56	15:50	16:38	17:41	08:24	09:33	10:30
54	16:02	16:51	17:54	08:12	09:20	10:17
52	16:13	17:03	18:05	08:01	09:08	10:05
50	16:23	17:14	18:16	07:52	08:57	09:55
45	16:44	17:36	18:37	07:31	08:35	09:33
40	17:00	17:54	18:54	07:15	08:18	09:16
35	17:15	18:08	19:09	07:01	08:03	09:01
30	17:27	18:21	19:22	06:50	07:50	08:48
20	17:48	18:44	19:43	06:29	07:28	08:26
10	18:07	19:03	20:02	06:11	07:09	08:07
0	18:24	19:21	20:19	05:55	06:51	07:49
-10	18:41	19:39	20:37	05:39	06:33	07:31
-20	18:60	19:58	20:55	05:21	06:14	07:12
-30	19:21	20:21	21:17	05:01	05:52	06:49
-35	19:34	20:34	21:30	04:49	05:39	06:36
-40	19:48	20:49	21:44	04:35	05:24	06:21
-45	20:06	21:07	22:01	04:19	05:07	06:03
-50	20:27	21:30	22:22	03:60	04:45	05:41
-52	20:38	21:40	22:33	03:51	04:34	05:30
-54	20:49	21:52	22:44	03:40	04:23	05:18
-56	21:02	22:06	22:57	03:28	04:09	05:04
-58	21:18	22:22	23:12	03:15	03:53	04:48
-60	21:36	22:42	23:30	02:59	03:35	04:29

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
12	06:41	06:27	11:53	00:37	12:09	16(100%)
13	06:13	05:59	11:54	00:37	13:05	17(98%)
14	05:45	05:31	11:54	01:34	14:04	18(94%)

December 15, 16 ,17 (Sun., Mon., Tue.)

	Aries	Venus		Mars		Jupiter		Saturn	
Sun	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	83°21.7	147°41.2	-23°08.8	218°40.3	-16°24.8	170°21.2	-23°17.5	152°18.8	-21°57.2
1	98°24.1	162°40.3	-23°08.3	233°41.1	-16°25.3	185°23.1	-23°17.5	167°21.0	-21°57.1
2	113°26.6	177°39.5	-23°07.8	248°41.9	-16°25.8	200°24.9	-23°17.5	182°23.1	-21°57.1
3	128°29.1	192°38.6	-23°07.3	263°42.7	-16°26.3	215°26.8	-23°17.5	197°25.3	-21°57.1
4	143°31.5	207°37.8	-23°06.8	278°43.5	-16°26.8	230°28.6	-23°17.5	212°27.5	-21°57.0
5	158°34.0	222°37.0	-23°06.3	293°44.3	-16°27.3	245°30.5	-23°17.5	227°29.6	-21°57.0
6	173°36.5	237°36.1	-23°05.8	308°45.1	-16°27.8	260°32.3	-23°17.5	242°31.8	-21°57.0
7	188°38.9	252°35.3	-23°05.3	323°45.9	-16°28.3	275°34.1	-23°17.5	257°34.0	-21°56.9
8	203°41.4	267°34.4	-23°04.8	338°46.7	-16°28.8	290°36.0	-23°17.4	272°36.1	-21°56.9
9	218°43.9	282°33.6	-23°04.3	353°47.5	-16°29.3	305°37.8	-23°17.4	287°38.3	-21°56.9
10	233°46.3	297°32.7	-23°03.7	8°48.3	-16°29.7	320°39.7	-23°17.4	302°40.5	-21°56.8
11	248°48.8	312°31.9	-23°03.2	23°49.1	-16°30.2	335°41.5	-23°17.4	317°42.7	-21°56.8
12	263°51.3	327°31.1	-23°02.7	38°49.9	-16°30.7	350°43.4	-23°17.4	332°44.8	-21°56.7
13	278°53.7	342°30.2	-23°02.2	53°50.7	-16°31.2	5°45.2	-23°17.4	347°47.0	-21°56.7
14	293°56.2	357°29.4	-23°01.7	68°51.5	-16°31.7	20°47.0	-23°17.4	2°49.2	-21°56.7
15	308°58.6	12°28.5	-23°01.2	83°52.3	-16°32.2	35°48.9	-23°17.4	17°51.3	-21°56.6
16	324°01.1	27°27.7	-23°00.7	98°53.1	-16°32.7	50°50.7	-23°17.4	32°53.5	-21°56.6
17	339°03.6	42°26.9	-23°00.2	113°53.9	-16°33.2	65°52.6	-23°17.4	47°55.7	-21°56.6
18	354°06.0	57°26.0	-22°59.7	128°54.7	-16°33.7	80°54.4	-23°17.4	62°57.8	-21°56.5
19	9°08.5	72°25.2	-22°59.1	143°55.6	-16°34.1	95°56.3	-23°17.3	78°00.0	-21°56.5
20	24°11.0	87°24.3	-22°58.6	158°56.4	-16°34.6	110°58.1	-23°17.3	93°02.2	-21°56.5
21	39°13.4	102°23.5	-22°58.1	173°57.2	-16°35.1	125°59.9	-23°17.3	108°04.3	-21°56.4
22	54°15.9	117°22.7	-22°57.6	188°58.0	-16°35.6	141°01.8	-23°17.3	123°06.5	-21°56.4
23	69°18.4	132°21.8	-22°57.1	203°58.8	-16°36.1	156°03.6	-23°17.3	138°08.7	-21°56.3
Mer.pass.:18:23		v-0.8 d0.5 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	84°20.8	147°21.0	-22°56.5	218°59.6	-16°36.6	171°05.5	-23°17.3	153°10.9	-21°56.3
1	99°23.3	162°20.2	-22°56.0	234°00.4	-16°37.1	186°07.3	-23°17.3	168°13.0	-21°56.3
2	114°25.8	177°19.3	-22°55.5	249°01.2	-16°37.6	201°09.2	-23°17.3	183°15.2	-21°56.2
3	129°28.2	192°18.5	-22°55.0	264°02.0	-16°38.0	216°11.0	-23°17.3	198°17.4	-21°56.2
4	144°30.7	207°17.7	-22°54.4	279°02.8	-16°38.5	231°12.8	-23°17.3	213°19.5	-21°56.2
5	159°33.1	222°16.8	-22°53.9	294°03.6	-16°39.0	246°14.7	-23°17.3	228°21.7	-21°56.1
6	174°35.6	237°16.0	-22°53.4	309°04.4	-16°39.5	261°16.5	-23°17.3	243°23.9	-21°56.1
7	189°38.1	252°15.2	-22°52.8	324°05.1	-16°40.0	276°18.4	-23°17.2	258°26.0	-21°56.0
8	204°40.5	267°14.3	-22°52.3	339°05.9	-16°40.5	291°20.2	-23°17.2	273°28.2	-21°56.0
9	219°43.0	282°13.5	-22°51.8	354°06.7	-16°41.0	306°22.0	-23°17.2	288°30.4	-21°56.0
10	234°45.5	297°12.7	-22°51.2	9°07.5	-16°41.4	321°23.9	-23°17.2	303°32.5	-21°55.9
11	249°47.9	312°11.8	-22°50.7	24°08.3	-16°41.9	336°25.7	-23°17.2	318°34.7	-21°55.9
12	264°50.4	327°11.0	-22°50.2	39°09.1	-16°42.4	351°27.6	-23°17.2	333°36.9	-21°55.9
13	279°52.9	342°10.2	-22°49.6	54°09.9	-16°42.9	6°29.4	-23°17.2	348°39.0	-21°55.8
14	294°55.3	357°09.3	-22°49.1	69°10.7	-16°43.4	21°31.3	-23°17.2	3°41.2	-21°55.8
15	309°57.8	12°08.5	-22°48.5	84°11.5	-16°43.9	36°33.1	-23°17.2	18°43.4	-21°55.8
16	325°00.3	27°07.7	-22°48.0	99°12.3	-16°44.3	51°34.9	-23°17.2	33°45.5	-21°55.7
17	340°02.7	42°06.9	-22°47.5	114°13.1	-16°44.8	66°36.8	-23°17.1	48°47.7	-21°55.7
18	355°05.2	57°06.0	-22°46.9	129°13.9	-16°45.3	81°38.6	-23°17.1	63°49.9	-21°55.6
19	10°07.6	72°05.2	-22°46.4	144°14.7	-16°45.8	96°40.5	-23°17.1	78°52.1	-21°55.6
20	25°10.1	87°04.4	-22°45.8	159°15.5	-16°46.3	111°42.3	-23°17.1	93°54.2	-21°55.6
21	40°12.6	102°03.6	-22°45.3	174°16.3	-16°46.8	126°44.1	-23°17.1	108°56.4	-21°55.5
22	55°15.0	117°02.7	-22°44.7	189°17.1	-16°47.2	141°46.0	-23°17.1	123°58.6	-21°55.5
23	70°17.5	132°01.9	-22°44.2	204°17.9	-16°47.7	156°47.8	-23°17.1	139°00.7	-21°55.5
Mer.pass.:18:19		v-0.8 d0.5 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	85°20.0	147°01.1	-22°43.6	219°18.7	-16°48.2	171°49.7	-23°17.1	154°02.9	-21°55.4
1	100°22.4	162°00.3	-22°43.1	234°19.5	-16°48.7	186°51.5	-23°17.1	169°05.1	-21°55.4
2	115°24.9	176°59.4	-22°42.5	249°20.3	-16°49.2	201°53.4	-23°17.1	184°07.2	-21°55.3
3	130°27.4	191°58.6	-22°42.0	264°21.1	-16°49.6	216°55.2	-23°17.1	199°09.4	-21°55.3
4	145°29.8	206°57.8	-22°41.4	279°21.9	-16°50.1	231°57.0	-23°17.0	214°11.6	-21°55.3
5	160°32.3	221°57.0	-22°40.8	294°22.7	-16°50.6	246°58.9	-23°17.0	229°13.7	-21°55.2
6	175°34.7	236°56.1	-22°40.3	309°23.5	-16°51.1	262°00.7	-23°17.0	244°15.9	-21°55.2
7	190°37.2	251°55.3	-22°39.7	324°24.3	-16°51.6	277°02.6	-23°17.0	259°18.1	-21°55.2
8	205°39.7	266°54.5	-22°39.2	339°25.1	-16°52.0	292°04.4	-23°17.0	274°20.2	-21°55.1
9	220°42.1	281°53.7	-22°38.6	354°25.9	-16°52.5	307°06.2	-23°17.0	289°22.4	-21°55.1
10	235°44.6	296°52.9	-22°38.0	9°26.7	-16°53.0	322°08.1	-23°17.0	304°24.6	-21°55.1
11	250°47.1	311°52.0	-22°37.5	24°27.4	-16°53.5	337°09.9	-23°17.0	319°26.7	-21°55.0
12	265°49.5	326°51.2	-22°36.9	39°28.2	-16°54.0	352°11.8	-23°17.0	334°28.9	-21°55.0
13	280°52.0	341°50.4	-22°36.3	54°29.0	-16°54.4	7°13.6	-23°16.9	349°31.1	-21°54.9
14	295°54.5	356°49.6	-22°35.8	69°29.8	-16°54.9	22°15.5	-23°16.9	4°33.2	-21°54.9
15	310°56.9	11°48.8	-22°35.2	84°30.6	-16°55.4	37°17.3	-23°16.9	19°35.4	-21°54.9
16	325°59.4	26°48.0	-22°34.6	99°31.4	-16°55.9	52°19.1	-23°16.9	34°37.6	-21°54.8
17	341°01.9	41°47.1	-22°34.1	114°32.2	-16°56.4	67°21.0	-23°16.9	49°39.7	-21°54.8
18	356°04.3	56°46.3	-22°33.5	129°33.0	-16°56.8	82°22.8	-23°16.9	64°41.9	-21°54.8
19	11°06.8	71°45.5	-22°32.9	144°33.8	-16°57.3	97°24.7	-23°16.9	79°44.1	-21°54.7
20	26°09.2	86°44.7	-22°32.4	159°34.6	-16°57.8	112°26.5	-23°16.9	94°46.2	-21°54.7
21	41°11.7	101°43.9	-22°31.8	174°35.4	-16°58.3	127°28.3	-23°16.9	109°48.4	-21°54.6
22	56°14.2	116°43.1	-22°31.2	189°36.2	-16°58.7	142°30.2	-23°16.9	124°50.6	-21°54.6
23	71°16.6	131°42.3	-22°30.6	204°37.0	-16°59.2	157°32.0	-23°16.8	139°52.7	-21°54.6
Mer.pass.:18:15		v-0.8 d0.6 m-3.8		v0.8 d-0.5 m1.7		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.9	29°12.1
Ankaa	353°11.2	-42°12.2
Schedar	349°35.3	56°39.0
Diphda	348°51.2	-17°52.8
Achernar	335°23.1	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°27.1	89°21.0
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.9
Aldebaran	290°43.9	16°32.9
Rigel	281°07.4	-8°10.8
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.1	7°24.5
Canopus	263°53.6	-52°42.4
Sirius	258°29.4	-16°44.5
Adara	255°08.7	-28°60.0
Procyon	244°54.7	5°10.5
Pollux	243°21.9	27°58.5
Avior	234°15.7	-59°34.2
Suhail	222°48.9	-43°30.6
Miaplacidus	221°38.3	-69°47.6
Alphard	217°51.5	-8°44.6
Regulus	207°38.6	11°52.2
Dubhe	193°46.1	61°38.4
Denebola	182°29.1	14°27.7
Gienah	175°47.8	-17°38.9
Acrux	173°04.5	-63°12.1
Gacrux	171°56.1	-57°13.1
Alioth	166°17.0	55°51.0
Spica	158°26.7	-11°15.7
Alcaid	152°55.6	49°12.8
Hadar	148°42.0	-60°27.7
Menkent	148°02.6	-36°27.7
Arcturus	145°51.7	19°05.1
Rigil Kent.	139°46.2	-60°54.7
Zubenelg.	137°00.8	-16°07.2
Kochab	137°21.0	74°04.3
Alphecca	126°07.6	26°39.0
Antares	112°21.1	-26°28.3
Atria	107°19.5	-69°03.5
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.3
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.2
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.4
Deneb	49°28.8	45°21.3
Enif	33°42.9	9°58.0
Alnair	27°38.3	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.2	28°11.5
Markab	13°34.0	15°18.8

2019/12/	SHA	Mer.pass
Venus	64°19.5	14:10
Mars	135°18.6	09:25
Jupiter	86°59.6	12:37
Saturn	68°57.1	13:49

2019/12/	SHA	Mer.pass
Venus	63°00.2	14:11
Mars	134°38.7	09:24
Jupiter	86°44.6	12:34
Saturn	68°50.0	13:45

2019/12/	SHA	Mer.pass
Venus	61°41.1	14:13
Mars	133°58.7	09:22
Jupiter	86°29.7	12:31
Saturn	68°42.9	13:42

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sun	GHA	Dec	GHA	ν	Dec	d	HP
0	181°19.1	-23°14.1	323°11.1	6.1	22°19.6	-4.0	58.6
1	196°18.8	-23°14.2	337°36.2	6.1	22°15.6	-4.1	58.6
2	211°18.5	-23°14.3	352°01.3	6.1	22°11.4	-4.3	58.6
3	226°18.2	-23°14.5	6°26.4	6.2	22°07.0	-4.4	58.6
4	241°17.9	-23°14.6	20°51.6	6.2	22°02.5	-4.6	58.7
5	256°17.6	-23°14.8	35°16.8	6.2	21°57.9	-4.7	58.7
6	271°17.3	-23°14.9	49°42.0	6.2	21°53.2	-4.8	58.7
7	286°17.0	-23°15.0	64°07.3	6.3	21°48.3	-5.0	58.7
8	301°16.7	-23°15.2	78°32.6	6.3	21°43.2	-5.1	58.7
9	316°16.4	-23°15.3	92°57.9	6.3	21°38.0	-5.3	58.7
10	331°16.1	-23°15.4	107°23.2	6.4	21°32.7	-5.4	58.7
11	346°15.8	-23°15.6	121°48.6	6.4	21°27.2	-5.5	58.7
12	1°15.5	-23°15.7	136°14.0	6.4	21°21.6	-5.7	58.8
13	16°15.2	-23°15.8	150°39.5	6.5	21°15.9	-5.8	58.8
14	31°14.9	-23°15.9	165°05.0	6.5	21°10.0	-5.9	58.8
15	46°14.6	-23°16.1	179°30.5	6.5	21°04.0	-6.1	58.8
16	61°14.3	-23°16.2	193°56.0	6.6	20°57.8	-6.2	58.8
17	76°14.0	-23°16.3	208°21.6	6.6	20°51.6	-6.3	58.8
18	91°13.7	-23°16.5	222°47.3	6.7	20°45.2	-6.5	58.8
19	106°13.4	-23°16.6	237°13.0	6.7	20°38.6	-6.6	58.8
20	121°13.1	-23°16.7	251°38.7	6.7	20°31.9	-6.7	58.8
21	136°12.8	-23°16.8	266°04.5	6.8	20°25.1	-6.9	58.9
22	151°12.5	-23°17.0	280°30.3	6.8	20°18.2	-7.0	58.9
23	166°12.2	-23°17.1	294°56.1	6.9	20°11.1	-7.1	58.9
	SD.=16.2	d=-0.1			S.D.=16.0		

Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	181°11.9	-23°17.2	309°22.0	6.9	20°03.9	-7.3	58.9
1	196°11.6	-23°17.3	323°48.0	7.0	19°56.6	-7.4	58.9
2	211°11.3	-23°17.4	338°14.0	7.0	19°49.1	-7.5	58.9
3	226°11.0	-23°17.6	352°40.0	7.1	19°41.6	-7.6	58.9
4	241°10.7	-23°17.7	7°06.1	7.1	19°33.9	-7.8	58.9
5	256°10.4	-23°17.8	21°32.2	7.2	19°26.1	-7.9	58.9
6	271°10.1	-23°17.9	35°58.4	7.2	19°18.1	-8.0	58.9
7	286°09.8	-23°18.0	50°24.7	7.3	19°10.0	-8.1	59.0
8	301°09.5	-23°18.1	64°51.0	7.3	19°01.9	-8.2	59.0
9	316°09.2	-23°18.2	79°17.3	7.4	18°53.6	-8.4	59.0
10	331°08.9	-23°18.4	93°43.7	7.4	18°45.1	-8.5	59.0
11	346°08.6	-23°18.5	108°10.2	7.5	18°36.6	-8.6	59.0
12	1°08.3	-23°18.6	122°36.7	7.5	18°28.0	-8.7	59.0
13	16°08.0	-23°18.7	137°03.2	7.6	18°19.2	-8.8	59.0
14	31°07.7	-23°18.8	151°29.9	7.6	18°10.3	-8.9	59.0
15	46°07.4	-23°18.9	165°56.5	7.7	18°01.3	-9.0	59.0
16	61°07.1	-23°19.0	180°23.2	7.7	17°52.2	-9.2	59.0
17	76°06.8	-23°19.1	194°50.0	7.8	17°43.0	-9.3	59.0
18	91°06.5	-23°19.2	209°16.8	7.9	17°33.7	-9.4	59.0
19	106°06.2	-23°19.3	223°43.7	7.9	17°24.2	-9.5	59.1
20	121°05.9	-23°19.4	238°10.7	8.0	17°14.7	-9.6	59.1
21	136°05.6	-23°19.5	252°37.7	8.0	17°05.1	-9.7	59.1
22	151°05.3	-23°19.7	267°04.7	8.1	16°55.3	-9.8	59.1
23	166°05.0	-23°19.8	281°31.8	8.1	16°45.5	-9.9	59.1
	SD.=16.3	d=-0.1			S.D.=16.1		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	181°04.7	-23°19.9	295°59.0	8.2	16°35.5	-10.0	59.1
1	196°04.4	-23°20.0	310°26.2	8.2	16°25.5	-10.1	59.1
2	211°04.0	-23°20.1	324°53.5	8.3	16°15.3	-10.2	59.1
3	226°03.7	-23°20.2	339°20.8	8.4	16°05.1	-10.3	59.1
4	241°03.4	-23°20.3	353°48.2	8.4	15°54.7	-10.4	59.1
5	256°03.1	-23°20.4	8°15.7	8.5	15°44.3	-10.5	59.1
6	271°02.8	-23°20.4	22°43.2	8.5	15°33.7	-10.6	59.1
7	286°02.5	-23°20.5	37°10.7	8.6	15°23.1	-10.7	59.1
8	301°02.2	-23°20.6	51°38.3	8.6	15°12.4	-10.8	59.1
9	316°01.9	-23°20.7	66°06.0	8.7	15°01.6	-10.9	59.1
10	331°01.6	-23°20.8	80°33.7	8.8	14°50.7	-10.9	59.1
11	346°01.3	-23°20.9	95°01.5	8.8	14°39.7	-11.0	59.1
12	1°01.0	-23°21.0	109°29.4	8.9	14°28.6	-11.1	59.1
13	16°00.7	-23°21.1	123°57.2	8.9	14°17.5	-11.2	59.2
14	31°00.4	-23°21.2	138°25.2	9.0	14°06.2	-11.3	59.2
15	46°00.1	-23°21.3	152°53.2	9.0	13°54.9	-11.4	59.2
16	60°59.8	-23°21.4	167°21.2	9.1	13°43.5	-11.4	59.2
17	75°59.5	-23°21.5	181°49.3	9.1	13°32.0	-11.5	59.2
18	90°59.2	-23°21.5	196°17.5	9.2	13°20.4	-11.6	59.2
19	105°58.9	-23°21.6	210°45.7	9.2	13°08.8	-11.7	59.2
20	120°58.6	-23°21.7	225°14.0	9.3	12°57.1	-11.8	59.2
21	135°58.3	-23°21.8	239°42.3	9.3	12°45.3	-11.8	59.2
22	150°58.0	-23°21.9	254°10.6	9.4	12°33.4	-11.9	59.2
23	165°57.6	-23°22.0	268°39.1	9.4	12°21.5	-12.0	59.2
	SD.=16.3	d=-0.1			S.D.=16.1		

Lat.	Twilight				Twilight	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:21	10:49	–:–	–:–	13:02	15:30
70	08:01	09:49	–:–	–:–	14:02	15:50
68	07:45	09:14	–:–	–:–	14:37	16:05
66	07:32	08:49	10:28	13:22	15:02	16:18
64	07:21	08:30	09:47	14:04	15:21	16:29
62	07:12	08:14	09:19	14:32	15:37	16:39
60	07:04	08:00	08:58	14:53	15:50	16:47
58	06:56	07:49	08:40	15:10	16:02	16:55
56	06:49	07:39	08:26	15:25	16:12	17:01
54	06:43	07:29	08:13	15:38	16:21	17:07
52	06:38	07:21	08:02	15:49	16:29	17:13
50	06:32	07:14	07:52	15:58	16:37	17:18
45	06:21	06:58	07:32	16:19	16:53	17:30
40	06:10	06:45	07:15	16:36	17:06	17:40
35	06:01	06:33	07:01	16:50	17:18	17:50
30	05:52	06:22	06:49	17:02	17:29	17:58
20	05:36	06:04	06:27	17:23	17:47	18:15
10	05:20	05:46	06:09	17:42	18:05	18:31
0	05:03	05:29	05:52	17:59	18:22	18:48
-10	04:44	05:11	05:34	18:17	18:40	19:07
-20	04:22	04:51	05:15	18:36	19:00	19:29
-30	03:53	04:26	04:53	18:58	19:25	19:58
-35	03:34	04:11	04:40	19:11	19:40	20:17
-40	03:11	03:53	04:25	19:26	19:58	20:40
-45	02:41	03:30	04:08	19:44	20:21	21:10
-50	01:56	03:01	03:45	20:06	20:50	21:56
-52	01:28	02:46	03:34	20:17	21:05	22:23
-54	00:44	02:28	03:22	20:29	21:23	23:08
-56	–:–	02:06	03:08	20:43	21:45	–:–
-58	–:–	01:37	02:51	20:60	22:15	–:–
-60	–:–	00:49	02:31	21:20	23:04	–:–

Lat.	Moonrise			Moonset		
	Sun	Mon	Tue	Sun	Mon	Tue
72	–:–	16:51	20:02	–:–	15:23	14:06
70	–:–	18:05	20:27	–:–	14:07	13:39
68	16:26	18:43	20:46	13:48	13:29	13:18
66	17:15	19:09	21:01	12:58	13:02	13:02
64	17:46	19:29	21:13	12:26	12:41	12:48
62	18:09	19:45	21:23	12:03	12:24	12:37
60	18:28	19:59	21:32	11:44	12:10	12:27
58	18:43	20:10	21:40	11:28	11:57	12:19
56	18:56	20:20	21:47	11:14	11:47	12:11
54	19:08	20:29	21:53	11:03	11:37	12:04
52	19:18	20:37	21:58	10:52	11:29	11:58
50	19:27	20:44	22:03	10:43	11:21	11:53
45	19:46	20:59	22:13	10:23	11:05	11:41
40	20:01	21:11	22:22	10:07	10:52	11:31
35	20:14	21:22	22:29	09:54	10:41	11:22
30	20:25	21:31	22:36	09:42	10:31	11:14
20	20:45	21:46	22:47	09:21	10:13	11:01
10	21:01	22:00	22:57	09:04	09:58	10:49
0	21:17	22:13	23:06	08:47	09:44	10:39
-10	21:33	22:25	23:15	08:30	09:30	10:27
-20	21:49	22:39	23:25	08:12	09:14	10:16
-30	22:08	22:54	23:36	07:52	08:56	10:02
-35	22:19	23:03	23:43	07:39	08:46	09:54
-40	22:32	23:14	23:50	07:25	08:34	09:45
-45	22:47	23:26	23:58	07:09	08:20	09:34
-50	23:05	23:40	–:–	06:48	08:03	09:21
-52	23:14	23:47	–:–	06:38	07:54	09:15
-54	23:24	23:54	–:–	06:27	07:45	09:08
-56	23:34	–:–	00:02	06:14	07:35	09:01
-58	23:47	–:–	00:11	05:60	07:23	08:52
-60	–:–	00:01	00:22	05:42	07:09	08:42

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
15	05:17	05:02	11:54	02:33	15:02	19(87%)
16	04:48	04:33	11:55	03:30	15:58	20(79%)
17	04:19	04:04	11:55	04:25	16:52	21(69%)

December 18, 19 ,20 (Wed., Thu., Fri.)

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	86°19.1	146°41.4	-22°30.0	219°37.7	-16°59.7	172°33.9	-23°16.8	154°54.9	-21°54.5
1	101°21.6	161°40.6	-22°29.5	234°38.5	-17°00.2	187°35.7	-23°16.8	169°57.1	-21°54.5
2	116°24.0	176°39.8	-22°28.9	249°39.3	-17°00.6	202°37.5	-23°16.8	184°59.2	-21°54.5
3	131°26.5	191°39.0	-22°28.3	264°40.1	-17°01.1	217°39.4	-23°16.8	200°01.4	-21°54.4
4	146°29.0	206°38.2	-22°27.7	279°40.9	-17°01.6	232°41.2	-23°16.8	215°03.6	-21°54.4
5	161°31.4	221°37.4	-22°27.1	294°41.7	-17°02.1	247°43.1	-23°16.8	230°05.7	-21°54.3
6	176°33.9	236°36.6	-22°26.5	309°42.5	-17°02.5	262°44.9	-23°16.8	245°07.9	-21°54.3
7	191°36.4	251°35.8	-22°26.0	324°43.3	-17°03.0	277°46.7	-23°16.8	260°10.1	-21°54.3
8	206°38.8	266°35.0	-22°25.4	339°44.1	-17°03.5	292°48.6	-23°16.7	275°12.2	-21°54.2
9	221°41.3	281°34.2	-22°24.8	354°44.9	-17°04.0	307°50.4	-23°16.7	290°14.4	-21°54.2
10	236°43.7	296°33.4	-22°24.2	9°45.7	-17°04.4	322°52.3	-23°16.7	305°16.5	-21°54.2
11	251°46.2	311°32.5	-22°23.6	24°46.4	-17°04.9	337°54.1	-23°16.7	320°18.7	-21°54.1
12	266°48.7	326°31.7	-22°23.0	39°47.2	-17°05.4	352°55.9	-23°16.7	335°20.9	-21°54.1
13	281°51.1	341°30.9	-22°22.4	54°48.0	-17°05.9	7°57.8	-23°16.7	350°23.0	-21°54.0
14	296°53.6	356°30.1	-22°21.8	69°48.8	-17°06.3	22°59.6	-23°16.7	5°25.2	-21°54.0
15	311°56.1	11°29.3	-22°21.2	84°49.6	-17°06.8	38°01.5	-23°16.7	20°27.4	-21°54.0
16	326°58.5	26°28.5	-22°20.6	99°50.4	-17°07.3	53°03.3	-23°16.7	35°29.5	-21°53.9
17	342°01.0	41°27.7	-22°20.0	114°51.2	-17°07.8	68°05.1	-23°16.6	50°31.7	-21°53.9
18	357°03.5	56°26.9	-22°19.4	129°52.0	-17°08.2	83°07.0	-23°16.6	65°33.9	-21°53.9
19	12°05.9	71°26.1	-22°18.8	144°52.8	-17°08.7	98°08.8	-23°16.6	80°36.0	-21°53.8
20	27°08.4	86°25.3	-22°18.2	159°53.5	-17°09.2	113°10.7	-23°16.6	95°38.2	-21°53.8
21	42°10.8	101°24.5	-22°17.6	174°54.3	-17°09.7	128°12.5	-23°16.6	110°40.4	-21°53.7
22	57°13.3	116°23.7	-22°17.0	189°55.1	-17°10.1	143°14.3	-23°16.6	125°42.5	-21°53.7
23	72°15.8	131°22.9	-22°16.4	204°55.9	-17°10.6	158°16.2	-23°16.6	140°44.7	-21°53.7
Mer.pass.:18:11		v-0.8 d0.6 m-3.8		v0.8 d-0.5 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	87°18.2	146°22.1	-22°15.8	219°56.7	-17°11.1	173°18.0	-23°16.6	155°46.9	-21°53.6
1	102°20.7	161°21.3	-22°15.2	234°57.5	-17°11.5	188°19.9	-23°16.5	170°49.0	-21°53.6
2	117°23.2	176°20.5	-22°14.6	249°58.3	-17°12.0	203°21.7	-23°16.5	185°51.2	-21°53.6
3	132°25.6	191°19.7	-22°14.0	264°59.0	-17°12.5	218°23.5	-23°16.5	200°53.4	-21°53.5
4	147°28.1	206°18.9	-22°13.4	279°59.8	-17°13.0	233°25.4	-23°16.5	215°55.5	-21°53.5
5	162°30.6	221°18.1	-22°12.8	295°00.6	-17°13.4	248°27.2	-23°16.5	230°57.7	-21°53.4
6	177°33.0	236°17.3	-22°12.2	310°01.4	-17°13.9	263°29.1	-23°16.5	245°59.9	-21°53.4
7	192°35.5	251°16.5	-22°11.5	325°02.2	-17°14.4	278°30.9	-23°16.5	261°02.0	-21°53.4
8	207°38.0	266°15.7	-22°10.9	340°03.0	-17°14.8	293°32.7	-23°16.5	276°04.2	-21°53.3
9	222°40.4	281°14.9	-22°10.3	355°03.8	-17°15.3	308°34.6	-23°16.5	291°06.3	-21°53.3
10	237°42.9	296°14.1	-22°09.7	10°04.5	-17°15.8	323°36.4	-23°16.4	306°08.5	-21°53.3
11	252°45.3	311°13.4	-22°09.1	25°05.3	-17°16.2	338°38.3	-23°16.4	321°10.7	-21°53.2
12	267°47.8	326°12.6	-22°08.5	40°06.1	-17°16.7	353°40.1	-23°16.4	336°12.8	-21°53.2
13	282°50.3	341°11.8	-22°07.8	55°06.9	-17°17.2	8°41.9	-23°16.4	351°15.0	-21°53.1
14	297°52.7	356°11.0	-22°07.2	70°07.7	-17°17.6	23°43.8	-23°16.4	6°17.2	-21°53.1
15	312°55.2	11°10.2	-22°06.6	85°08.5	-17°18.1	38°45.6	-23°16.4	21°19.3	-21°53.1
16	327°57.7	26°09.4	-22°06.0	100°09.3	-17°18.6	53°47.5	-23°16.4	36°21.5	-21°53.0
17	343°00.1	41°08.6	-22°05.3	115°10.0	-17°19.0	68°49.3	-23°16.4	51°23.7	-21°53.0
18	358°02.6	56°07.8	-22°04.7	130°10.8	-17°19.5	83°51.1	-23°16.3	66°25.8	-21°52.9
19	13°05.1	71°07.0	-22°04.1	145°11.6	-17°20.0	98°53.0	-23°16.3	81°28.0	-21°52.9
20	28°07.5	86°06.2	-22°03.5	160°12.4	-17°20.4	113°54.8	-23°16.3	96°30.1	-21°52.9
21	43°10.0	101°05.4	-22°02.8	175°13.2	-17°20.9	128°56.7	-23°16.3	111°32.3	-21°52.8
22	58°12.5	116°04.7	-22°02.2	190°14.0	-17°21.4	143°58.5	-23°16.3	126°34.5	-21°52.8
23	73°14.9	131°03.9	-22°01.6	205°14.7	-17°21.8	159°00.3	-23°16.3	141°36.6	-21°52.8
Mer.pass.:18:07		v-0.8 d0.6 m-3.8		v0.8 d-0.5 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Fri	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	88°17.4	146°03.1	-22°00.9	220°15.5	-17°22.3	174°02.2	-23°16.3	156°38.8	-21°52.7
1	103°19.8	161°02.3	-22°00.3	235°16.3	-17°22.8	189°04.0	-23°16.2	171°41.0	-21°52.7
2	118°22.3	176°01.5	-21°59.7	250°17.1	-17°23.2	204°05.9	-23°16.2	186°43.1	-21°52.6
3	133°24.8	191°00.7	-21°59.0	265°17.9	-17°23.7	219°07.7	-23°16.2	201°45.3	-21°52.6
4	148°27.2	205°59.9	-21°58.4	280°18.7	-17°24.2	234°09.5	-23°16.2	216°47.5	-21°52.6
5	163°29.7	220°59.2	-21°57.8	295°19.4	-17°24.6	249°11.4	-23°16.2	231°49.6	-21°52.5
6	178°32.2	235°58.4	-21°57.1	310°20.2	-17°25.1	264°13.2	-23°16.2	246°51.8	-21°52.5
7	193°34.6	250°57.6	-21°56.5	325°21.0	-17°25.6	279°15.1	-23°16.2	261°53.9	-21°52.4
8	208°37.1	265°56.8	-21°55.8	340°21.8	-17°26.0	294°16.9	-23°16.2	276°56.1	-21°52.4
9	223°39.6	280°56.0	-21°55.2	355°22.6	-17°26.5	309°18.7	-23°16.1	291°58.3	-21°52.4
10	238°42.0	295°55.2	-21°54.5	10°23.3	-17°27.0	324°20.6	-23°16.1	307°00.4	-21°52.3
11	253°44.5	310°54.5	-21°53.9	25°24.1	-17°27.4	339°22.4	-23°16.1	322°02.6	-21°52.3
12	268°46.9	325°53.7	-21°53.3	40°24.9	-17°27.9	354°24.3	-23°16.1	337°04.8	-21°52.3
13	283°49.4	340°52.9	-21°52.6	55°25.7	-17°28.4	9°26.1	-23°16.1	352°06.9	-21°52.2
14	298°51.9	355°52.1	-21°52.0	70°26.5	-17°28.8	24°27.9	-23°16.1	7°09.1	-21°52.2
15	313°54.3	10°51.3	-21°51.3	85°27.2	-17°29.3	39°29.8	-23°16.1	22°11.3	-21°52.1
16	328°56.8	25°50.6	-21°50.7	100°28.0	-17°29.7	54°31.6	-23°16.0	37°13.4	-21°52.1
17	343°59.3	40°49.8	-21°50.0	115°28.8	-17°30.2	69°33.5	-23°16.0	52°15.6	-21°52.1
18	359°01.7	55°49.0	-21°49.4	130°29.6	-17°30.7	84°35.3	-23°16.0	67°17.7	-21°52.0
19	14°04.2	70°48.2	-21°48.7	145°30.4	-17°31.1	99°37.1	-23°16.0	82°19.9	-21°52.0
20	29°06.7	85°47.5	-21°48.0	160°31.1	-17°31.6	114°39.0	-23°16.0	97°22.1	-21°51.9
21	44°09.1	100°46.7	-21°47.4	175°31.9	-17°32.0	129°40.8	-23°16.0	112°24.2	-21°51.9
22	59°11.6	115°45.9	-21°46.7	190°32.7	-17°32.5	144°42.6	-23°16.0	127°26.4	-21°51.9
23	74°14.1	130°45.1	-21°46.1	205°33.5	-17°33.0	159°44.5	-23°16.0	142°28.6	-21°51.8
Mer.pass.:18:03		v-0.8 d0.6 m-3.8		v0.8 d-0.5 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

Star	SHA	Dec
Alpheratz	357°38.9	29°12.1
Ankaa	353°11.2	-42°12.2
Schedar	349°35.3	56°39.0
Diphda	348°51.2	-17°52.9
Achernar	335°23.1	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°28.0	89°21.0
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°10.0
Mirfak	308°33.5	49°55.9
Aldebaran	290°43.9	16°32.9
Rigel	281°07.4	-8°10.9
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.1	7°24.5
Canopus	263°53.6	-52°42.4
Sirius	258°29.4	-16°44.5
Adara	255°08.6	-28°60.0
Procyon	244°54.7	5°10.5
Pollux	243°21.8	27°58.5
Avior	234°15.7	-59°34.2
Suhail	222°48.9	-43°30.6
Miaplacidus	221°38.2	-69°47.7
Alphard	217°51.5	-8°44.6
Regulus	207°38.6	11°52.2
Dubhe	193°46.0	61°38.4
Denebola	182°29.0	14°27.7
Gienah	175°47.7	-17°38.9
Acrux	173°04.5	-63°12.1
Gacrux	171°56.1	-57°13.1
Alioth	166°16.9	55°50.9
Spica	158°26.7	-11°15.7
Alcaid	152°55.6	49°12.7
Hadar	148°42.0	-60°27.7
Menkent	148°02.6	-36°27.8
Arcturus	145°51.7	19°05.1
Rigil Kent.	139°46.2	-60°54.7
Zubenelg.	137°00.7	-16°07.2
Kochab	137°20.9	74°04.3
Alphecca	126°07.6	26°38.9
Antares	112°21.1	-26°28.3
Atria	107°19.5	-69°03.5
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.3
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.2
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.4
Deneb	49°28.8	45°21.3
Enif	33°42.9	9°58.0
Alnair	27°38.4	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.2	28°11.5
Markab	13°34.0	15°18.8

2019/12/	SHA	Mer.pass
Venus	60°22.3	14:14
Mars	133°18.6	09:21
Jupiter	86°14.8	12:28
Saturn	68°35.8	13:38

2019/12/	SHA	Mer.pass
Venus	59°03.9	14:15
Mars	132°38.4	09:20
Jupiter	85°59.8	12:25
Saturn	68°28.6	13:35

2019/12/	SHA	Mer.pass
Venus	57°45.7	14:17
Mars	131°58.1	09:18
Jupiter	85°44.8	12:22
Saturn	68°21.4	13:31

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Wed	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°57.3	-23°22.1	283°07.5	9.5	12°09.5	-12.0	59.2
1	195°57.0	-23°22.1	297°36.0	9.5	11°57.4	-12.1	59.2
2	210°56.7	-23°22.2	312°04.6	9.6	11°45.2	-12.2	59.2
3	225°56.4	-23°22.3	326°33.2	9.6	11°33.0	-12.2	59.2
4	240°56.1	-23°22.4	341°01.9	9.7	11°20.7	-12.3	59.2
5	255°55.8	-23°22.5	355°30.6	9.7	11°08.4	-12.4	59.2
6	270°55.5	-23°22.5	9°59.3	9.8	10°56.0	-12.4	59.2
7	285°55.2	-23°22.6	24°28.1	9.8	10°43.5	-12.5	59.2
8	300°54.9	-23°22.7	38°57.0	9.9	10°31.0	-12.6	59.2
9	315°54.6	-23°22.8	53°25.9	9.9	10°18.4	-12.6	59.2
10	330°54.3	-23°22.8	67°54.8	10.0	10°05.7	-12.7	59.2
11	345°54.0	-23°22.9	82°23.8	10.0	9°53.0	-12.7	59.2
12	0°53.7	-23°23.0	96°52.8	10.0	9°40.3	-12.8	59.2
13	15°53.4	-23°23.0	111°21.9	10.1	9°27.5	-12.8	59.2
14	30°53.0	-23°23.1	125°51.0	10.1	9°14.6	-12.9	59.2
15	45°52.7	-23°23.2	140°20.1	10.2	9°01.7	-12.9	59.2
16	60°52.4	-23°23.3	154°49.3	10.2	8°48.7	-13.0	59.2
17	75°52.1	-23°23.3	169°18.5	10.2	8°35.7	-13.0	59.2
18	90°51.8	-23°23.4	183°47.8	10.3	8°22.6	-13.1	59.2
19	105°51.5	-23°23.5	198°17.1	10.3	8°09.5	-13.1	59.2
20	120°51.2	-23°23.5	212°46.4	10.4	7°56.4	-13.2	59.2
21	135°50.9	-23°23.6	227°15.8	10.4	7°43.2	-13.2	59.2
22	150°50.6	-23°23.7	241°45.2	10.4	7°29.9	-13.3	59.2
23	165°50.3	-23°23.7	256°14.6	10.5	7°16.6	-13.3	59.2
	SD.=16.3	d=-0.1			S.D.=16.1		

Thu	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°50.0	-23°23.8	270°44.1	10.5	7°03.3	-13.3	59.2
1	195°49.7	-23°23.8	285°13.6	10.5	6°50.0	-13.4	59.2
2	210°49.4	-23°23.9	299°43.1	10.6	6°36.6	-13.4	59.2
3	225°49.0	-23°24.0	314°12.7	10.6	6°23.1	-13.4	59.2
4	240°48.7	-23°24.0	328°42.3	10.6	6°09.7	-13.5	59.2
5	255°48.4	-23°24.1	343°11.9	10.6	5°56.2	-13.5	59.2
6	270°48.1	-23°24.1	357°41.6	10.7	5°42.6	-13.5	59.2
7	285°47.8	-23°24.2	12°11.3	10.7	5°29.1	-13.6	59.2
8	300°47.5	-23°24.3	26°41.0	10.7	5°15.5	-13.6	59.2
9	315°47.2	-23°24.3	41°10.7	10.7	5°01.9	-13.6	59.2
10	330°46.9	-23°24.4	55°40.5	10.8	4°48.2	-13.7	59.2
11	345°46.6	-23°24.4	70°10.2	10.8	4°34.5	-13.7	59.2
12	0°46.3	-23°24.5	84°40.1	10.8	4°20.8	-13.7	59.2
13	15°46.0	-23°24.5	99°09.9	10.8	4°07.1	-13.7	59.2
14	30°45.7	-23°24.6	113°39.7	10.9	3°53.4	-13.7	59.2
15	45°45.3	-23°24.6	128°09.6	10.9	3°39.6	-13.8	59.2
16	60°45.0	-23°24.7	142°39.5	10.9	3°25.9	-13.8	59.2
17	75°44.7	-23°24.7	157°09.4	10.9	3°12.1	-13.8	59.2
18	90°44.4	-23°24.8	171°39.3	10.9	2°58.2	-13.8	59.2
19	105°44.1	-23°24.8	186°09.2	10.9	2°44.4	-13.8	59.2
20	120°43.8	-23°24.9	200°39.2	11.0	2°30.6	-13.8	59.2
21	135°43.5	-23°24.9	215°09.1	11.0	2°16.7	-13.9	59.2
22	150°43.2	-23°25.0	229°39.1	11.0	2°02.9	-13.9	59.2
23	165°42.9	-23°25.0	244°09.1	11.0	1°49.0	-13.9	59.2
	SD.=16.3	d=-0.1			S.D.=16.2		

Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°42.6	-23°25.0	258°39.1	11.0	1°35.1	-13.9	59.2
1	195°42.3	-23°25.1	273°09.1	11.0	1°21.2	-13.9	59.2
2	210°41.9	-23°25.1	287°39.1	11.0	1°07.3	-13.9	59.2
3	225°41.6	-23°25.2	302°09.2	11.0	0°53.4	-13.9	59.2
4	240°41.3	-23°25.2	316°39.2	11.0	0°39.5	-13.9	59.2
5	255°41.0	-23°25.2	331°09.2	11.0	0°25.6	-13.9	59.2
6	270°40.7	-23°25.3	345°39.3	11.0	0°11.7	-13.9	59.1
7	285°40.4	-23°25.3	0°09.3	11.1	-0°02.2	-13.9	59.1
8	300°40.1	-23°25.4	14°39.4	11.1	-0°16.1	-13.9	59.1
9	315°39.8	-23°25.4	29°09.5	11.1	-0°30.0	-13.9	59.1
10	330°39.5	-23°25.4	43°39.5	11.1	-0°43.9	-13.9	59.1
11	345°39.2	-23°25.5	58°09.6	11.1	-0°57.8	-13.9	59.1
12	0°38.8	-23°25.5	72°39.6	11.1	-1°11.7	-13.9	59.1
13	15°38.5	-23°25.5	87°09.7	11.1	-1°25.5	-13.9	59.1
14	30°38.2	-23°25.6	101°39.7	11.1	-1°39.4	-13.9	59.1
15	45°37.9	-23°25.6	116°09.8	11.0	-1°53.3	-13.9	59.1
16	60°37.6	-23°25.6	130°39.8	11.0	-2°07.1	-13.8	59.1
17	75°37.3	-23°25.7	145°09.9	11.0	-2°20.9	-13.8	59.1
18	90°37.0	-23°25.7	159°39.9	11.0	-2°34.8	-13.8	59.1
19	105°36.7	-23°25.7	174°09.9	11.0	-2°48.6	-13.8	59.1
20	120°36.4	-23°25.7	188°40.0	11.0	-3°02.4	-13.8	59.1
21	135°36.1	-23°25.8	203°10.0	11.0	-3°16.1	-13.8	59.1
22	150°35.7	-23°25.8	217°40.0	11.0	-3°29.9	-13.7	59.1
23	165°35.4	-23°25.8	232°10.0	11.0	-3°43.6	-13.7	59.1
	SD.=16.3	d=-0.0			S.D.=16.1		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:24	10:55	–:–	–:–	12:59	15:30
70	08:04	09:53	–:–	–:–	14:01	15:50
68	07:48	09:17	–:–	–:–	14:36	16:06
66	07:35	08:52	10:33	13:21	15:02	16:19
64	07:24	08:32	09:50	14:03	15:21	16:30
62	07:14	08:16	09:22	14:32	15:37	16:39
60	07:06	08:03	09:00	14:53	15:51	16:48
58	06:58	07:51	08:43	15:11	16:03	16:55
56	06:52	07:41	08:28	15:26	16:13	17:02
54	06:45	07:32	08:15	15:38	16:22	17:08
52	06:40	07:23	08:04	15:49	16:30	17:14
50	06:34	07:16	07:54	15:59	16:38	17:19
45	06:23	06:60	07:34	16:20	16:54	17:31
40	06:12	06:46	07:17	16:37	17:07	17:42
35	06:03	06:35	07:03	16:51	17:19	17:51
30	05:54	06:24	06:50	17:03	17:30	17:60
20	05:38	06:05	06:29	17:25	17:49	18:16
10	05:21	05:48	06:11	17:43	18:06	18:32
0	05:04	05:31	05:53	18:01	18:23	18:49
-10	04:45	05:13	05:36	18:18	18:41	19:08
-20	04:23	04:52	05:17	18:37	19:02	19:31
-30	03:54	04:27	04:55	18:59	19:27	20:00
-35	03:35	04:12	04:42	19:12	19:42	20:19
-40	03:12	03:54	04:26	19:27	20:00	20:42
-45	02:41	03:31	04:08	19:45	20:23	21:13
-50	01:56	03:01	03:46	20:08	20:53	21:58
-52	01:28	02:46	03:35	20:19	21:08	22:26
-54	00:42	02:28	03:23	20:31	21:26	23:13
-56	–:–	02:06	03:08	20:45	21:48	–:–
-58	–:–	01:36	02:52	21:02	22:18	–:–
-60	–:–	00:46	02:31	21:23	23:09	–:–

	Moonrise			**Moonset**		
Lat.	Wed	Thu	Fri	Wed	Thu	Fri
72	22:21	–:–	00:30	13:35	13:12	12:52
70	22:33	–:–	00:32	13:21	13:07	12:54
68	22:42	–:–	00:34	13:10	13:03	12:56
66	22:49	–:–	00:35	13:01	12:59	12:57
64	22:55	–:–	00:36	12:53	12:56	12:58
62	23:01	–:–	00:37	12:46	12:53	12:59
60	23:05	–:–	00:38	12:40	12:51	13:00
58	23:10	–:–	00:39	12:35	12:49	13:01
56	23:13	–:–	00:39	12:30	12:47	13:02
54	23:16	–:–	00:40	12:26	12:45	13:03
52	23:19	–:–	00:40	12:22	12:43	13:03
50	23:22	–:–	00:41	12:19	12:42	13:04
45	23:28	–:–	00:42	12:11	12:39	13:05
40	23:33	–:–	00:43	12:05	12:36	13:06
35	23:37	–:–	00:44	11:59	12:34	13:07
30	23:41	–:–	00:44	11:54	12:31	13:08
20	23:47	–:–	00:45	11:46	12:28	13:09
10	23:52	–:–	00:47	11:38	12:25	13:10
0	23:58	–:–	00:48	11:31	12:21	13:11
-10	–:–	00:03	00:49	11:24	12:18	13:12
-20	–:–	00:08	00:50	11:16	12:15	13:13
-30	–:–	00:15	00:51	11:07	12:11	13:15
-35	–:–	00:18	00:52	11:02	12:09	13:15
-40	–:–	00:22	00:53	10:56	12:06	13:16
-45	–:–	00:27	00:54	10:49	12:03	13:17
-50	00:08	00:32	00:55	10:40	11:60	13:18
-52	00:13	00:35	00:55	10:37	11:58	13:19
-54	00:18	00:38	00:56	10:32	11:56	13:19
-56	00:23	00:41	00:56	10:28	11:54	13:20
-58	00:30	00:44	00:57	10:22	11:52	13:21
-60	00:37	00:48	00:58	10:16	11:49	13:21

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
18	03:49	03:35	11:56	05:18	17:44	22(58%)
19	03:20	03:05	11:56	06:09	18:34	23(47%)
20	02:50	02:35	11:57	06:59	19:24	24(36%)

December 21, 22 ,23 (Sat., Sun., Mon.)

Sat	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	89°16.5	145°44.4	-21°45.4	220°34.3	-17°33.4	174°46.3	-23°15.9	157°30.7	-21°51.8
1	104°19.0	160°43.6	-21°44.8	235°35.0	-17°33.9	189°48.2	-23°15.9	172°32.9	-21°51.8
2	119°21.4	175°42.8	-21°44.1	250°35.8	-17°34.4	204°50.0	-23°15.9	187°35.0	-21°51.7
3	134°23.9	190°42.0	-21°43.4	265°36.6	-17°34.8	219°51.8	-23°15.9	202°37.2	-21°51.7
4	149°26.4	205°41.3	-21°42.8	280°37.4	-17°35.3	234°53.7	-23°15.9	217°39.4	-21°51.6
5	164°28.8	220°40.5	-21°42.1	295°38.1	-17°35.7	249°55.5	-23°15.9	232°41.5	-21°51.6
6	179°31.3	235°39.7	-21°41.4	310°38.9	-17°36.2	264°57.4	-23°15.9	247°43.7	-21°51.6
7	194°33.8	250°39.0	-21°40.8	325°39.7	-17°36.6	279°59.2	-23°15.8	262°45.8	-21°51.5
8	209°36.2	265°38.2	-21°40.1	340°40.5	-17°37.1	295°01.0	-23°15.8	277°48.0	-21°51.5
9	224°38.7	280°37.4	-21°39.4	355°41.2	-17°37.6	310°02.9	-23°15.8	292°50.2	-21°51.4
10	239°41.2	295°36.7	-21°38.8	10°42.0	-17°38.0	325°04.7	-23°15.8	307°52.3	-21°51.4
11	254°43.6	310°35.9	-21°38.1	25°42.8	-17°38.5	340°06.6	-23°15.8	322°54.5	-21°51.4
12	269°46.1	325°35.1	-21°37.4	40°43.6	-17°38.9	355°08.4	-23°15.8	337°56.7	-21°51.3
13	284°48.6	340°34.4	-21°36.8	55°44.4	-17°39.4	10°10.2	-23°15.8	352°58.8	-21°51.3
14	299°51.0	355°33.6	-21°36.1	70°45.1	-17°39.9	25°12.1	-23°15.7	8°01.0	-21°51.3
15	314°53.5	10°32.8	-21°35.4	85°45.9	-17°40.3	40°13.9	-23°15.7	23°03.1	-21°51.2
16	329°55.9	25°32.1	-21°34.7	100°46.7	-17°40.8	55°15.7	-23°15.7	38°05.3	-21°51.2
17	344°58.4	40°31.3	-21°34.0	115°47.5	-17°41.2	70°17.6	-23°15.7	53°07.5	-21°51.1
18	0°00.9	55°30.5	-21°33.4	130°48.2	-17°41.7	85°19.4	-23°15.7	68°09.6	-21°51.1
19	15°03.3	70°29.8	-21°32.7	145°49.0	-17°42.1	100°21.3	-23°15.7	83°11.8	-21°51.1
20	30°05.8	85°29.0	-21°32.0	160°49.8	-17°42.6	115°23.1	-23°15.6	98°14.0	-21°51.0
21	45°08.3	100°28.2	-21°31.3	175°50.6	-17°43.1	130°24.9	-23°15.6	113°16.1	-21°51.0
22	60°10.7	115°27.5	-21°30.6	190°51.3	-17°43.5	145°26.8	-23°15.6	128°18.3	-21°50.9
23	75°13.2	130°26.7	-21°30.0	205°52.1	-17°44.0	160°28.6	-23°15.6	143°20.4	-21°50.9
Mer.pass.:17:59		v-0.8 d0.7 m-3.8		v0.8 d-0.5 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Sun	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	90°15.7	145°26.0	-21°29.3	220°52.9	-17°44.4	175°30.5	-23°15.6	158°22.6	-21°50.9
1	105°18.1	160°25.2	-21°28.6	235°53.7	-17°44.9	190°32.3	-23°15.6	173°24.8	-21°50.8
2	120°20.6	175°24.4	-21°27.9	250°54.4	-17°45.3	205°34.1	-23°15.6	188°26.9	-21°50.8
3	135°23.0	190°23.7	-21°27.2	265°55.2	-17°45.8	220°36.0	-23°15.5	203°29.1	-21°50.7
4	150°25.5	205°22.9	-21°26.5	280°56.0	-17°46.2	235°37.8	-23°15.5	218°31.2	-21°50.7
5	165°28.0	220°22.2	-21°25.8	295°56.7	-17°46.7	250°39.6	-23°15.5	233°33.4	-21°50.7
6	180°30.4	235°21.4	-21°25.1	310°57.5	-17°47.1	265°41.5	-23°15.5	248°35.6	-21°50.6
7	195°32.9	250°20.7	-21°24.5	325°58.3	-17°47.6	280°43.3	-23°15.5	263°37.7	-21°50.6
8	210°35.4	265°19.9	-21°23.8	340°59.1	-17°48.1	295°45.2	-23°15.5	278°39.9	-21°50.6
9	225°37.8	280°19.1	-21°23.1	355°59.8	-17°48.5	310°47.0	-23°15.5	293°42.0	-21°50.5
10	240°40.3	295°18.4	-21°22.4	11°00.6	-17°49.0	325°48.8	-23°15.4	308°44.2	-21°50.5
11	255°42.8	310°17.6	-21°21.7	26°01.4	-17°49.4	340°50.7	-23°15.4	323°46.4	-21°50.4
12	270°45.2	325°16.9	-21°21.0	41°02.2	-17°49.9	355°52.5	-23°15.4	338°48.5	-21°50.4
13	285°47.7	340°16.1	-21°20.3	56°02.9	-17°50.3	10°54.4	-23°15.4	353°50.7	-21°50.4
14	300°50.2	355°15.4	-21°19.6	71°03.7	-17°50.8	25°56.2	-23°15.4	8°52.8	-21°50.3
15	315°52.6	10°14.6	-21°18.9	86°04.5	-17°51.2	40°58.0	-23°15.4	23°55.0	-21°50.3
16	330°55.1	25°13.9	-21°18.2	101°05.2	-17°51.7	55°59.9	-23°15.3	38°57.2	-21°50.2
17	345°57.5	40°13.1	-21°17.5	116°06.0	-17°52.1	71°01.7	-23°15.3	53°59.3	-21°50.2
18	1°00.0	55°12.4	-21°16.8	131°06.8	-17°52.6	86°03.5	-23°15.3	69°01.5	-21°50.2
19	16°02.5	70°11.6	-21°16.1	146°07.5	-17°53.0	101°05.4	-23°15.3	84°03.7	-21°50.1
20	31°04.9	85°10.9	-21°15.4	161°08.3	-17°53.5	116°07.2	-23°15.3	99°05.8	-21°50.1
21	46°07.4	100°10.1	-21°14.6	176°09.1	-17°53.9	131°09.1	-23°15.3	114°08.0	-21°50.0
22	61°09.9	115°09.4	-21°13.9	191°09.9	-17°54.4	146°10.9	-23°15.2	129°10.1	-21°50.0
23	76°12.3	130°08.6	-21°13.2	206°10.6	-17°54.8	161°12.7	-23°15.2	144°12.3	-21°50.0
Mer.pass.:17:56		v-0.8 d0.7 m-3.8		v0.8 d-0.5 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Mon	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	91°14.8	145°07.9	-21°12.5	221°11.4	-17°55.3	176°14.6	-23°15.2	159°14.5	-21°49.9
1	106°17.3	160°07.1	-21°11.8	236°12.2	-17°55.7	191°16.4	-23°15.2	174°16.6	-21°49.9
2	121°19.7	175°06.4	-21°11.1	251°12.9	-17°56.2	206°18.3	-23°15.2	189°18.8	-21°49.8
3	136°22.2	190°05.6	-21°10.4	266°13.7	-17°56.6	221°20.1	-23°15.2	204°20.9	-21°49.8
4	151°24.7	205°04.9	-21°09.7	281°14.5	-17°57.1	236°21.9	-23°15.2	219°23.1	-21°49.8
5	166°27.1	220°04.2	-21°09.0	296°15.2	-17°57.5	251°23.8	-23°15.1	234°25.3	-21°49.7
6	181°29.6	235°03.4	-21°08.2	311°16.0	-17°58.0	266°25.6	-23°15.1	249°27.4	-21°49.7
7	196°32.0	250°02.7	-21°07.5	326°16.8	-17°58.4	281°27.4	-23°15.1	264°29.6	-21°49.6
8	211°34.5	265°01.9	-21°06.8	341°17.5	-17°58.9	296°29.3	-23°15.1	279°31.7	-21°49.6
9	226°37.0	280°01.2	-21°06.1	356°18.3	-17°59.3	311°31.1	-23°15.1	294°33.9	-21°49.6
10	241°39.4	295°00.5	-21°05.4	11°19.1	-17°59.8	326°33.0	-23°15.1	309°36.1	-21°49.5
11	256°41.9	309°59.7	-21°04.6	26°19.9	-18°00.2	341°34.8	-23°15.0	324°38.2	-21°49.5
12	271°44.4	324°59.0	-21°03.9	41°20.6	-18°00.7	356°36.6	-23°15.0	339°40.4	-21°49.4
13	286°46.8	339°58.2	-21°03.2	56°21.4	-18°01.1	11°38.5	-23°15.0	354°42.5	-21°49.4
14	301°49.3	354°57.5	-21°02.5	71°22.2	-18°01.5	26°40.3	-23°15.0	9°44.7	-21°49.4
15	316°51.8	9°56.8	-21°01.7	86°22.9	-18°02.0	41°42.1	-23°15.0	24°46.8	-21°49.3
16	331°54.2	24°56.0	-21°01.0	101°23.7	-18°02.4	56°44.0	-23°15.0	39°49.0	-21°49.3
17	346°56.7	39°55.3	-21°00.3	116°24.5	-18°02.9	71°45.8	-23°14.9	54°51.2	-21°49.2
18	1°59.2	54°54.5	-20°59.6	131°25.2	-18°03.3	86°47.7	-23°14.9	69°53.3	-21°49.2
19	17°01.6	69°53.8	-20°58.8	146°26.0	-18°03.8	101°49.5	-23°14.9	84°55.5	-21°49.2
20	32°04.1	84°53.1	-20°58.1	161°26.8	-18°04.2	116°51.3	-23°14.9	99°57.6	-21°49.1
21	47°06.5	99°52.3	-20°57.4	176°27.5	-18°04.7	131°53.2	-23°14.9	114°59.8	-21°49.1
22	62°09.0	114°51.6	-20°56.6	191°28.3	-18°05.1	146°55.0	-23°14.9	130°02.0	-21°49.0
23	77°11.5	129°50.9	-20°55.9	206°29.0	-18°05.6	161°56.9	-23°14.8	145°04.1	-21°49.0
Mer.pass.:17:52		v-0.7 d0.7 m-3.8		v0.8 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.9	29°12.1
Ankaa	353°11.2	-42°12.2
Schedar	349°35.4	56°39.0
Diphda	348°51.2	-17°52.9
Achernar	335°23.2	-57°08.5
Hamal	327°55.5	23°33.4
Polaris	315°28.8	89°21.0
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°09.9
Mirfak	308°33.5	49°55.9
Aldebaran	290°43.9	16°32.9
Rigel	281°07.4	-8°10.9
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.1	7°24.5
Canopus	263°53.6	-52°42.4
Sirius	258°29.4	-16°44.5
Adara	255°08.6	-28°60.0
Procyon	244°54.7	5°10.5
Pollux	243°21.8	27°58.5
Avior	234°15.7	-59°34.2
Suhail	222°48.9	-43°30.6
Miaplacidus	221°38.2	-69°47.7
Alphard	217°51.5	-8°44.7
Regulus	207°38.6	11°52.2
Dubhe	193°46.0	61°38.4
Denebola	182°29.0	14°27.7
Gienah	175°47.7	-17°38.9
Acrux	173°04.5	-63°12.2
Gacrux	171°56.0	-57°13.1
Alioth	166°16.9	55°50.9
Spica	158°26.7	-11°15.7
Alcaid	152°55.6	49°12.7
Hadar	148°41.9	-60°27.7
Menkent	148°02.6	-36°27.8
Arcturus	145°51.7	19°05.1
Rigil Kent.	139°46.1	-60°54.6
Zubenelg.	137°00.7	-16°07.2
Kochab	137°20.9	74°04.3
Alphecca	126°07.5	26°38.9
Antares	112°21.1	-26°28.3
Atria	107°19.5	-69°03.5
Sabik	102°07.8	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.3
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.2
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.4
Deneb	49°28.8	45°21.3
Enif	33°43.0	9°58.0
Alnair	27°38.4	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.2	28°11.5
Markab	13°34.0	15°18.8

2019/12/	SHA	Mer.pass
Venus	56°27.8	14:18
Mars	131°17.7	09:17
Jupiter	85°29.8	12:19
Saturn	68°14.2	13:28

2019/12/	SHA	Mer.pass
Venus	55°10.3	14:19
Mars	130°37.2	09:16
Jupiter	85°14.8	12:16
Saturn	68°06.9	13:25

2019/12/	SHA	Mer.pass
Venus	53°53.1	14:20
Mars	129°56.6	09:15
Jupiter	84°59.8	12:14
Saturn	67°59.7	13:21

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°35.1	-23°25.8	246°40.0	11.0	-3°57.3	-13.7	59.1
1	195°34.8	-23°25.9	261°09.9	11.0	-4°11.0	-13.7	59.0
2	210°34.5	-23°25.9	275°39.9	10.9	-4°24.6	-13.6	59.0
3	225°34.2	-23°25.9	290°09.8	10.9	-4°38.3	-13.6	59.0
4	240°33.9	-23°25.9	304°39.7	10.9	-4°51.9	-13.6	59.0
5	255°33.6	-23°25.9	319°09.6	10.9	-5°05.4	-13.6	59.0
6	270°33.3	-23°26.0	333°39.5	10.9	-5°19.0	-13.5	59.0
7	285°32.9	-23°26.0	348°09.4	10.9	-5°32.5	-13.5	59.0
8	300°32.6	-23°26.0	2°39.3	10.8	-5°46.0	-13.5	59.0
9	315°32.3	-23°26.0	17°09.1	10.8	-5°59.4	-13.4	59.0
10	330°32.0	-23°26.0	31°38.9	10.8	-6°12.8	-13.4	59.0
11	345°31.7	-23°26.0	46°08.7	10.8	-6°26.2	-13.4	59.0
12	0°31.4	-23°26.1	60°38.5	10.8	-6°39.6	-13.3	59.0
13	15°31.1	-23°26.1	75°08.2	10.7	-6°52.9	-13.3	59.0
14	30°30.8	-23°26.1	89°38.0	10.7	-7°06.1	-13.2	58.9
15	45°30.5	-23°26.1	104°07.7	10.7	-7°19.3	-13.2	58.9
16	60°30.1	-23°26.1	118°37.3	10.7	-7°32.5	-13.2	58.9
17	75°29.8	-23°26.1	133°07.0	10.6	-7°45.6	-13.1	58.9
18	90°29.5	-23°26.1	147°36.6	10.6	-7°58.7	-13.1	58.9
19	105°29.2	-23°26.1	162°06.2	10.6	-8°11.8	-13.0	58.9
20	120°28.9	-23°26.1	176°35.8	10.6	-8°24.8	-13.0	58.9
21	135°28.6	-23°26.1	191°05.3	10.5	-8°37.7	-12.9	58.9
22	150°28.3	-23°26.1	205°34.8	10.5	-8°50.6	-12.9	58.9
23	165°28.0	-23°26.1	220°04.3	10.5	-9°03.5	-12.8	58.9
	SD.=16.3	d=-0.0			S.D.=16.1		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°27.7	-23°26.2	234°33.8	10.4	-9°16.3	-12.8	58.9
1	195°27.3	-23°26.2	249°03.2	10.4	-9°29.0	-12.7	58.8
2	210°27.0	-23°26.2	263°32.6	10.4	-9°41.7	-12.7	58.8
3	225°26.7	-23°26.2	278°01.9	10.3	-9°54.3	-12.6	58.8
4	240°26.4	-23°26.2	292°31.3	10.3	-10°06.9	-12.5	58.8
5	255°26.1	-23°26.2	307°00.5	10.3	-10°19.4	-12.5	58.8
6	270°25.8	-23°26.2	321°29.8	10.2	-10°31.8	-12.4	58.8
7	285°25.5	-23°26.2	335°59.0	10.2	-10°44.2	-12.4	58.8
8	300°25.2	-23°26.2	350°28.2	10.2	-10°56.6	-12.3	58.8
9	315°24.8	-23°26.2	4°57.4	10.1	-11°08.8	-12.2	58.8
10	330°24.5	-23°26.1	19°26.5	10.1	-11°21.0	-12.2	58.7
11	345°24.2	-23°26.1	33°55.5	10.1	-11°33.1	-12.1	58.7
12	0°23.9	-23°26.1	48°24.6	10.0	-11°45.2	-12.0	58.7
13	15°23.6	-23°26.1	62°53.6	10.0	-11°57.2	-12.0	58.7
14	30°23.3	-23°26.1	77°22.5	9.9	-12°09.1	-11.9	58.7
15	45°23.0	-23°26.1	91°51.5	9.9	-12°21.0	-11.8	58.7
16	60°22.7	-23°26.1	106°20.3	9.9	-12°32.8	-11.7	58.7
17	75°22.4	-23°26.1	120°49.2	9.8	-12°44.5	-11.7	58.7
18	90°22.0	-23°26.1	135°18.0	9.8	-12°56.1	-11.6	58.6
19	105°21.7	-23°26.1	149°46.8	9.7	-13°07.7	-11.5	58.6
20	120°21.4	-23°26.1	164°15.5	9.7	-13°19.1	-11.4	58.6
21	135°21.1	-23°26.0	178°44.2	9.7	-13°30.5	-11.4	58.6
22	150°20.8	-23°26.0	193°12.8	9.6	-13°41.9	-11.3	58.6
23	165°20.5	-23°26.0	207°41.4	9.6	-13°53.1	-11.2	58.6
	SD.=16.3	d=-0.0			S.D.=16.1		

Mon	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	180°20.2	-23°26.0	222°10.0	9.5	-14°04.3	-11.1	58.6
1	195°19.9	-23°26.0	236°38.5	9.5	-14°15.3	-11.0	58.6
2	210°19.5	-23°26.0	251°07.0	9.5	-14°26.3	-10.9	58.5
3	225°19.2	-23°26.0	265°35.4	9.4	-14°37.2	-10.9	58.5
4	240°18.9	-23°25.9	280°03.8	9.4	-14°48.1	-10.8	58.5
5	255°18.6	-23°25.9	294°32.1	9.3	-14°58.8	-10.7	58.5
6	270°18.3	-23°25.9	309°00.4	9.3	-15°09.4	-10.6	58.5
7	285°18.0	-23°25.9	323°28.7	9.2	-15°20.0	-10.5	58.5
8	300°17.7	-23°25.8	337°56.9	9.2	-15°30.4	-10.4	58.5
9	315°17.4	-23°25.8	352°25.1	9.2	-15°40.8	-10.3	58.4
10	330°17.0	-23°25.8	6°53.2	9.1	-15°51.1	-10.2	58.4
11	345°16.7	-23°25.8	21°21.3	9.1	-16°01.3	-10.1	58.4
12	0°16.4	-23°25.8	35°49.4	9.0	-16°11.4	-10.0	58.4
13	15°16.1	-23°25.7	50°17.4	9.0	-16°21.3	-9.9	58.4
14	30°15.8	-23°25.7	64°45.4	8.9	-16°31.2	-9.8	58.4
15	45°15.5	-23°25.7	79°13.3	8.9	-16°41.0	-9.7	58.3
16	60°15.2	-23°25.6	93°41.2	8.9	-16°50.7	-9.6	58.3
17	75°14.9	-23°25.6	108°09.0	8.8	-17°00.3	-9.5	58.3
18	90°14.6	-23°25.6	122°36.8	8.8	-17°09.8	-9.4	58.3
19	105°14.2	-23°25.6	137°04.6	8.7	-17°19.2	-9.3	58.3
20	120°13.9	-23°25.5	151°32.3	8.7	-17°28.4	-9.2	58.3
21	135°13.6	-23°25.5	165°59.9	8.7	-17°37.6	-9.1	58.2
22	150°13.3	-23°25.5	180°27.6	8.6	-17°46.7	-9.0	58.2
23	165°13.0	-23°25.4	194°55.2	8.6	-17°55.6	-8.9	58.2
	SD.=16.3	d=0.0			S.D.=16.0		

Lat.	**Twilight**				**Twilight**	
	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:26	10:58	–:–	–:–	12:59	15:31
70	08:06	09:55	–:–	–:–	14:02	15:51
68	07:50	09:19	–:–	–:–	14:37	16:07
66	07:37	08:54	10:35	13:22	15:03	16:20
64	07:26	08:34	09:52	14:05	15:23	16:31
62	07:16	08:18	09:24	14:33	15:39	16:41
60	07:08	08:04	09:02	14:55	15:52	16:49
58	07:00	07:53	08:45	15:12	16:04	16:57
56	06:53	07:42	08:30	15:27	16:14	17:04
54	06:47	07:33	08:17	15:40	16:23	17:10
52	06:41	07:25	08:06	15:51	16:32	17:15
50	06:36	07:18	07:56	16:01	16:39	17:21
45	06:24	07:02	07:35	16:21	16:55	17:33
40	06:14	06:48	07:19	16:38	17:09	17:43
35	06:04	06:36	07:04	16:52	17:21	17:52
30	05:56	06:26	06:52	17:05	17:31	18:01
20	05:39	06:07	06:31	17:26	17:50	18:18
10	05:23	05:49	06:12	17:45	18:08	18:34
0	05:06	05:32	05:55	18:02	18:25	18:51
-10	04:47	05:14	05:37	18:20	18:43	19:10
-20	04:24	04:53	05:18	18:39	19:03	19:33
-30	03:55	04:28	04:56	19:01	19:28	20:02
-35	03:36	04:13	04:43	19:14	19:44	20:20
-40	03:13	03:55	04:28	19:29	20:02	20:44
-45	02:42	03:32	04:10	19:47	20:24	21:14
-50	01:57	03:03	03:47	20:10	20:54	21:60
-52	01:29	02:47	03:36	20:21	21:09	22:28
-54	00:42	02:29	03:24	20:33	21:27	23:15
-56	–:–	02:07	03:10	20:47	21:50	–:–
-58	–:–	01:37	02:53	21:04	22:20	–:–
-60	–:–	00:46	02:32	21:25	23:11	–:–

Lat.	**Moonrise**			**Moonset**		
	Sat	Sun	Mon	Sat	Sun	Mon
72	02:37	04:50	07:22	12:31	12:05	11:21
70	02:30	04:32	06:43	12:40	12:25	12:02
68	02:25	04:18	06:16	12:48	12:40	12:30
66	02:20	04:06	05:55	12:55	12:53	12:52
64	02:16	03:57	05:39	13:01	13:04	13:09
62	02:13	03:49	05:26	13:06	13:13	13:24
60	02:10	03:42	05:14	13:10	13:21	13:36
58	02:07	03:36	05:05	13:14	13:28	13:46
56	02:05	03:31	04:56	13:17	13:35	13:55
54	02:03	03:26	04:49	13:20	13:40	14:04
52	02:01	03:22	04:42	13:23	13:45	14:11
50	01:59	03:18	04:36	13:26	13:50	14:18
45	01:56	03:09	04:23	13:31	13:60	14:32
40	01:53	03:02	04:12	13:36	14:08	14:44
35	01:50	02:57	04:03	13:40	14:15	14:54
30	01:48	02:51	03:55	13:44	14:22	15:03
20	01:44	02:42	03:42	13:50	14:33	15:18
10	01:40	02:35	03:30	13:56	14:43	15:31
0	01:37	02:27	03:19	14:01	14:52	15:44
-10	01:34	02:20	03:08	14:06	15:01	15:57
-20	01:31	02:13	02:56	14:12	15:11	16:10
-30	01:27	02:04	02:43	14:18	15:22	16:26
-35	01:25	01:59	02:36	14:22	15:28	16:35
-40	01:23	01:53	02:27	14:26	15:36	16:45
-45	01:20	01:47	02:17	14:31	15:44	16:58
-50	01:17	01:39	02:05	14:37	15:55	17:13
-52	01:15	01:36	01:60	14:39	15:60	17:20
-54	01:13	01:32	01:53	14:42	16:05	17:27
-56	01:12	01:28	01:47	14:46	16:11	17:36
-58	01:10	01:23	01:39	14:49	16:18	17:46
-60	01:07	01:18	01:31	14:53	16:26	17:57

Day	**Sun**			**Moon**		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
21	02:21	02:06	11:57	07:49	20:14	25(25%)
22	01:51	01:36	11:58	08:39	21:05	26(16%)
23	01:21	01:06	11:58	09:31	21:58	27(9%)

December 24, 25 ,26 (Tue., Wed., Thu.)

Tue	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	92°13.9	144°50.1	-20°55.2	221°29.8	-18°06.0	176°58.7	-23°14.8	160°06.3	-21°49.0
1	107°16.4	159°49.4	-20°54.4	236°30.6	-18°06.4	192°00.5	-23°14.8	175°08.4	-21°48.9
2	122°18.9	174°48.7	-20°53.7	251°31.3	-18°06.9	207°02.4	-23°14.8	190°10.6	-21°48.9
3	137°21.3	189°47.9	-20°52.9	266°32.1	-18°07.3	222°04.2	-23°14.8	205°12.8	-21°48.9
4	152°23.8	204°47.2	-20°52.2	281°32.9	-18°07.8	237°06.0	-23°14.8	220°14.9	-21°48.8
5	167°26.3	219°46.5	-20°51.5	296°33.6	-18°08.2	252°07.9	-23°14.7	235°17.1	-21°48.8
6	182°28.7	234°45.8	-20°50.7	311°34.4	-18°08.7	267°09.7	-23°14.7	250°19.2	-21°48.7
7	197°31.2	249°45.0	-20°50.0	326°35.2	-18°09.1	282°11.6	-23°14.7	265°21.4	-21°48.7
8	212°33.6	264°44.3	-20°49.2	341°35.9	-18°09.5	297°13.4	-23°14.7	280°23.6	-21°48.7
9	227°36.1	279°43.6	-20°48.5	356°36.7	-18°10.0	312°15.2	-23°14.7	295°25.7	-21°48.6
10	242°38.6	294°42.9	-20°47.7	11°37.5	-18°10.4	327°17.1	-23°14.6	310°27.9	-21°48.6
11	257°41.0	309°42.1	-20°47.0	26°38.2	-18°10.9	342°18.9	-23°14.6	325°30.0	-21°48.5
12	272°43.5	324°41.4	-20°46.3	41°39.0	-18°11.3	357°20.7	-23°14.6	340°32.2	-21°48.5
13	287°46.0	339°40.7	-20°45.5	56°39.7	-18°11.7	12°22.6	-23°14.6	355°34.3	-21°48.5
14	302°48.4	354°40.0	-20°44.8	71°40.5	-18°12.2	27°24.4	-23°14.6	10°36.5	-21°48.4
15	317°50.9	9°39.2	-20°44.0	86°41.3	-18°12.6	42°26.3	-23°14.6	25°38.7	-21°48.4
16	332°53.4	24°38.5	-20°43.3	101°42.0	-18°13.1	57°28.1	-23°14.5	40°40.8	-21°48.3
17	347°55.8	39°37.8	-20°42.5	116°42.8	-18°13.5	72°29.9	-23°14.5	55°43.0	-21°48.3
18	2°58.3	54°37.1	-20°41.7	131°43.6	-18°13.9	87°31.8	-23°14.5	70°45.1	-21°48.3
19	18°00.8	69°36.3	-20°41.0	146°44.3	-18°14.4	102°33.6	-23°14.5	85°47.3	-21°48.2
20	33°03.2	84°35.6	-20°40.2	161°45.1	-18°14.8	117°35.4	-23°14.5	100°49.5	-21°48.2
21	48°05.7	99°34.9	-20°39.5	176°45.8	-18°15.3	132°37.3	-23°14.5	115°51.6	-21°48.1
22	63°08.1	114°34.2	-20°38.7	191°46.6	-18°15.7	147°39.1	-23°14.4	130°53.8	-21°48.1
23	78°10.6	129°33.5	-20°38.0	206°47.4	-18°16.1	162°41.0	-23°14.4	145°55.9	-21°48.0
Mer.pass.:17:48		v-0.7 d0.7 m-3.9		v0.8 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	93°13.1	144°32.7	-20°37.2	221°48.1	-18°16.6	177°42.8	-23°14.4	160°58.1	-21°48.0
1	108°15.5	159°32.0	-20°36.4	236°48.9	-18°17.0	192°44.6	-23°14.4	176°00.2	-21°48.0
2	123°18.0	174°31.3	-20°35.7	251°49.6	-18°17.5	207°46.5	-23°14.4	191°02.4	-21°47.9
3	138°20.5	189°30.6	-20°34.9	266°50.4	-18°17.9	222°48.3	-23°14.3	206°04.6	-21°47.9
4	153°22.9	204°29.9	-20°34.2	281°51.2	-18°18.3	237°50.1	-23°14.3	221°06.7	-21°47.8
5	168°25.4	219°29.2	-20°33.4	296°51.9	-18°18.8	252°52.0	-23°14.3	236°08.9	-21°47.8
6	183°27.9	234°28.4	-20°32.6	311°52.7	-18°19.2	267°53.8	-23°14.3	251°11.0	-21°47.8
7	198°30.3	249°27.7	-20°31.9	326°53.4	-18°19.6	282°55.7	-23°14.3	266°13.2	-21°47.7
8	213°32.8	264°27.0	-20°31.1	341°54.2	-18°20.1	297°57.5	-23°14.3	281°15.4	-21°47.7
9	228°35.3	279°26.3	-20°30.3	356°55.0	-18°20.5	312°59.3	-23°14.2	296°17.5	-21°47.6
10	243°37.7	294°25.6	-20°29.5	11°55.7	-18°21.0	328°01.2	-23°14.2	311°19.7	-21°47.6
11	258°40.2	309°24.9	-20°28.8	26°56.5	-18°21.4	343°03.0	-23°14.2	326°21.8	-21°47.6
12	273°42.6	324°24.2	-20°28.0	41°57.2	-18°21.8	358°04.8	-23°14.2	341°24.0	-21°47.5
13	288°45.1	339°23.5	-20°27.2	56°58.0	-18°22.3	13°06.7	-23°14.2	356°26.1	-21°47.5
14	303°47.6	354°22.8	-20°26.5	71°58.8	-18°22.7	28°08.5	-23°14.1	11°28.3	-21°47.4
15	318°50.0	9°22.0	-20°25.7	86°59.5	-18°23.1	43°10.4	-23°14.1	26°30.5	-21°47.4
16	333°52.5	24°21.3	-20°24.9	102°00.3	-18°23.6	58°12.2	-23°14.1	41°32.6	-21°47.4
17	348°55.0	39°20.6	-20°24.1	117°01.0	-18°24.0	73°14.0	-23°14.1	56°34.8	-21°47.3
18	3°57.4	54°19.9	-20°23.4	132°01.8	-18°24.4	88°15.9	-23°14.1	71°36.9	-21°47.3
19	18°59.9	69°19.2	-20°22.6	147°02.6	-18°24.9	103°17.7	-23°14.1	86°39.1	-21°47.2
20	34°02.4	84°18.5	-20°21.8	162°03.3	-18°25.3	118°19.5	-23°14.0	101°41.2	-21°47.2
21	49°04.8	99°17.8	-20°21.0	177°04.1	-18°25.7	133°21.4	-23°14.0	116°43.4	-21°47.2
22	64°07.3	114°17.1	-20°20.2	192°04.8	-18°26.2	148°23.2	-23°14.0	131°45.6	-21°47.1
23	79°09.8	129°16.4	-20°19.4	207°05.6	-18°26.6	163°25.1	-23°14.0	146°47.7	-21°47.1
Mer.pass.:17:44		v-0.7 d0.8 m-3.9		v0.8 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Thu	Aries GHA	Venus GHA	Venus Dec	Mars GHA	Mars Dec	Jupiter GHA	Jupiter Dec	Saturn GHA	Saturn Dec
0	94°12.2	144°15.7	-20°18.7	222°06.3	-18°27.0	178°26.9	-23°14.0	161°49.9	-21°47.0
1	109°14.7	159°15.0	-20°17.9	237°07.1	-18°27.5	193°28.7	-23°13.9	176°52.0	-21°47.0
2	124°17.1	174°14.3	-20°17.1	252°07.9	-18°27.9	208°30.6	-23°13.9	191°54.2	-21°47.0
3	139°19.6	189°13.6	-20°16.3	267°08.6	-18°28.3	223°32.4	-23°13.9	206°56.3	-21°46.9
4	154°22.1	204°12.9	-20°15.5	282°09.4	-18°28.8	238°34.2	-23°13.9	221°58.5	-21°46.9
5	169°24.5	219°12.2	-20°14.7	297°10.1	-18°29.2	253°36.1	-23°13.9	237°00.7	-21°46.8
6	184°27.0	234°11.5	-20°13.9	312°10.9	-18°29.6	268°37.9	-23°13.8	252°02.8	-21°46.8
7	199°29.5	249°10.8	-20°13.2	327°11.6	-18°30.1	283°39.8	-23°13.8	267°05.0	-21°46.8
8	214°31.9	264°10.1	-20°12.4	342°12.4	-18°30.5	298°41.6	-23°13.8	282°07.1	-21°46.7
9	229°34.4	279°09.4	-20°11.6	357°13.1	-18°30.9	313°43.4	-23°13.8	297°09.3	-21°46.7
10	244°36.9	294°08.7	-20°10.8	12°13.9	-18°31.3	328°45.3	-23°13.8	312°11.4	-21°46.6
11	259°39.3	309°08.0	-20°10.0	27°14.6	-18°31.8	343°47.1	-23°13.7	327°13.6	-21°46.6
12	274°41.8	324°07.3	-20°09.2	42°15.4	-18°32.2	358°48.9	-23°13.7	342°15.8	-21°46.6
13	289°44.3	339°06.6	-20°08.4	57°16.2	-18°32.6	13°50.8	-23°13.7	357°17.9	-21°46.5
14	304°46.7	354°05.9	-20°07.6	72°16.9	-18°33.1	28°52.6	-23°13.7	12°20.1	-21°46.5
15	319°49.2	9°05.2	-20°06.8	87°17.7	-18°33.5	43°54.5	-23°13.7	27°22.2	-21°46.4
16	334°51.6	24°04.5	-20°06.0	102°18.4	-18°33.9	58°56.3	-23°13.6	42°24.4	-21°46.4
17	349°54.1	39°03.8	-20°05.2	117°19.2	-18°34.3	73°58.1	-23°13.6	57°26.5	-21°46.3
18	4°56.6	54°03.1	-20°04.4	132°19.9	-18°34.8	88°60.0	-23°13.6	72°28.7	-21°46.3
19	19°59.0	69°02.4	-20°03.6	147°20.7	-18°35.2	104°01.8	-23°13.6	87°30.8	-21°46.3
20	35°01.5	84°01.7	-20°02.8	162°21.4	-18°35.6	119°03.6	-23°13.6	102°33.0	-21°46.2
21	50°04.0	99°01.0	-20°02.0	177°22.2	-18°36.1	134°05.5	-23°13.5	117°35.2	-21°46.2
22	65°06.4	114°00.4	-20°01.2	192°22.9	-18°36.5	149°07.3	-23°13.5	132°37.3	-21°46.1
23	80°08.9	128°59.7	-20°00.4	207°23.7	-18°36.9	164°09.2	-23°13.5	147°39.5	-21°46.1
Mer.pass.:17:40		v-0.7 d0.8 m-3.9		v0.8 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.9	29°12.1
Ankaa	353°11.2	-42°12.2
Schedar	349°35.4	56°39.0
Diphda	348°51.2	-17°52.9
Achernar	335°23.2	-57°08.5
Hamal	327°55.6	23°33.4
Polaris	315°29.5	89°21.0
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°09.9
Mirfak	308°33.5	49°55.9
Aldebaran	290°43.9	16°32.9
Rigel	281°07.4	-8°10.9
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.1	7°24.5
Canopus	263°53.6	-52°42.5
Sirius	258°29.3	-16°44.5
Adara	255°08.6	-29°00.0
Procyon	244°54.7	5°10.5
Pollux	243°21.8	27°58.5
Avior	234°15.7	-59°34.3
Suhail	222°48.8	-43°30.6
Miaplacidus	221°38.1	-69°47.7
Alphard	217°51.5	-8°44.7
Regulus	207°38.5	11°52.1
Dubhe	193°46.0	61°38.4
Denebola	182°29.0	14°27.6
Gienah	175°47.7	-17°39.0
Acrux	173°04.4	-63°12.2
Gacrux	171°56.0	-57°13.1
Alioth	166°16.9	55°50.9
Spica	158°26.6	-11°15.7
Alcaid	152°55.5	49°12.7
Hadar	148°41.9	-60°27.7
Menkent	148°02.5	-36°27.8
Arcturus	145°51.7	19°05.0
Rigil Kent.	139°46.1	-60°54.6
Zubenelg.	137°00.7	-16°07.3
Kochab	137°20.8	74°04.3
Alphecca	126°07.5	26°38.9
Antares	112°21.1	-26°28.3
Atria	107°19.4	-69°03.5
Sabik	102°07.7	-15°44.8
Shaula	96°16.3	-37°06.9
Rasalhague	96°02.7	12°32.9
Etamin	90°44.6	51°29.2
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.2
Nunki	75°53.2	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.4
Deneb	49°28.8	45°21.2
Enif	33°43.0	9°58.0
Alnair	27°38.4	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.2	28°11.5
Markab	13°34.0	15°18.8

2019/12/	SHA	Mer.pass
Venus	52°36.2	14:21
Mars	129°15.9	09:14
Jupiter	84°44.8	12:11
Saturn	67°52.3	13:18

2019/12/	SHA	Mer.pass
Venus	51°19.7	14:23
Mars	128°35.1	09:12
Jupiter	84°29.7	12:08
Saturn	67°45.0	13:14

2019/12/	SHA	Mer.pass
Venus	50°03.5	14:24
Mars	127°54.1	09:11
Jupiter	84°14.7	12:05
Saturn	67°37.7	13:11

Horizontal paralax	
Venus:	0.1
Mars:	0.1

2019 December 24 to Dec. 26

h	Sun		Moon				
Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	180°12.7	-23°25.4	209°22.7	8.5	-18°04.5	-8.8	58.2
1	195°12.4	-23°25.3	223°50.2	8.5	-18°13.2	-8.7	58.2
2	210°12.1	-23°25.3	238°17.7	8.5	-18°21.9	-8.6	58.2
3	225°11.7	-23°25.3	252°45.2	8.4	-18°30.4	-8.5	58.1
4	240°11.4	-23°25.2	267°12.6	8.4	-18°38.8	-8.4	58.1
5	255°11.1	-23°25.2	281°39.9	8.3	-18°47.1	-8.2	58.1
6	270°10.8	-23°25.2	296°07.2	8.3	-18°55.3	-8.1	58.1
7	285°10.5	-23°25.1	310°34.5	8.3	-19°03.3	-8.0	58.1
8	300°10.2	-23°25.1	325°01.8	8.2	-19°11.3	-7.9	58.0
9	315°09.9	-23°25.0	339°29.0	8.2	-19°19.1	-7.8	58.0
10	330°09.6	-23°25.0	353°56.2	8.2	-19°26.8	-7.7	58.0
11	345°09.2	-23°24.9	8°23.3	8.1	-19°34.4	-7.5	58.0
12	0°08.9	-23°24.9	22°50.4	8.1	-19°41.9	-7.4	58.0
13	15°08.6	-23°24.8	37°17.5	8.1	-19°49.3	-7.3	58.0
14	30°08.3	-23°24.8	51°44.5	8.0	-19°56.5	-7.2	57.9
15	45°08.0	-23°24.8	66°11.6	8.0	-20°03.6	-7.1	57.9
16	60°07.7	-23°24.7	80°38.5	8.0	-20°10.6	-6.9	57.9
17	75°07.4	-23°24.7	95°05.5	7.9	-20°17.5	-6.8	57.9
18	90°07.1	-23°24.6	109°32.4	7.9	-20°24.2	-6.7	57.9
19	105°06.8	-23°24.6	123°59.3	7.9	-20°30.9	-6.6	57.8
20	120°06.4	-23°24.5	138°26.2	7.9	-20°37.4	-6.4	57.8
21	135°06.1	-23°24.5	152°53.0	7.8	-20°43.7	-6.3	57.8
22	150°05.8	-23°24.4	167°19.8	7.8	-20°50.0	-6.2	57.8
23	165°05.5	-23°24.3	181°46.6	7.8	-20°56.1	-6.1	57.7
	SD.=16.3	d=0.0			S.D.=15.9		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	180°05.2	-23°24.3	196°13.4	7.8	-21°02.1	-5.9	57.7
1	195°04.9	-23°24.2	210°40.1	7.7	-21°07.9	-5.8	57.7
2	210°04.6	-23°24.2	225°06.9	7.7	-21°13.7	-5.7	57.7
3	225°04.3	-23°24.1	239°33.6	7.7	-21°19.3	-5.5	57.7
4	240°03.9	-23°24.1	254°00.2	7.7	-21°24.8	-5.4	57.6
5	255°03.6	-23°24.0	268°26.9	7.7	-21°30.1	-5.3	57.6
6	270°03.3	-23°23.9	282°53.6	7.6	-21°35.3	-5.1	57.6
7	285°03.0	-23°23.9	297°20.2	7.6	-21°40.4	-5.0	57.6
8	300°02.7	-23°23.8	311°46.8	7.6	-21°45.3	-4.9	57.6
9	315°02.4	-23°23.8	326°13.4	7.6	-21°50.2	-4.8	57.5
10	330°02.1	-23°23.7	340°40.0	7.6	-21°54.8	-4.6	57.5
11	345°01.8	-23°23.6	355°06.6	7.6	-21°59.4	-4.5	57.5
12	0°01.5	-23°23.6	9°33.1	7.6	-22°03.8	-4.4	57.5
13	15°01.1	-23°23.5	23°59.7	7.5	-22°08.1	-4.2	57.4
14	30°00.8	-23°23.4	38°26.2	7.5	-22°12.2	-4.1	57.4
15	45°00.5	-23°23.4	52°52.7	7.5	-22°16.3	-3.9	57.4
16	60°00.2	-23°23.3	67°19.3	7.5	-22°20.1	-3.8	57.4
17	74°59.9	-23°23.2	81°45.8	7.5	-22°23.9	-3.7	57.4
18	89°59.6	-23°23.2	96°12.3	7.5	-22°27.5	-3.5	57.3
19	104°59.3	-23°23.1	110°38.8	7.5	-22°31.0	-3.4	57.3
20	119°59.0	-23°23.0	125°05.4	7.5	-22°34.3	-3.3	57.3
21	134°58.7	-23°22.9	139°31.9	7.5	-22°37.5	-3.1	57.3
22	149°58.3	-23°22.9	153°58.4	7.5	-22°40.6	-3.0	57.2
23	164°58.0	-23°22.8	168°24.9	7.5	-22°43.5	-2.9	57.2
	SD.=16.3	d=0.1			S.D.=15.7		

Thu	GHA	Dec	GHA	ν	Dec	d	HP
0	179°57.7	-23°22.7	182°51.5	7.5	-22°46.3	-2.7	57.2
1	194°57.4	-23°22.7	197°18.0	7.5	-22°49.0	-2.6	57.2
2	209°57.1	-23°22.6	211°44.5	7.5	-22°51.5	-2.5	57.1
3	224°56.8	-23°22.5	226°11.1	7.6	-22°53.9	-2.3	57.1
4	239°56.5	-23°22.4	240°37.6	7.6	-22°56.1	-2.2	57.1
5	254°56.2	-23°22.3	255°04.2	7.6	-22°58.2	-2.0	57.1
6	269°55.9	-23°22.3	269°30.8	7.6	-23°00.2	-1.9	57.0
7	284°55.5	-23°22.2	283°57.4	7.6	-23°02.1	-1.8	57.0
8	299°55.2	-23°22.1	298°24.0	7.6	-23°03.8	-1.6	57.0
9	314°54.9	-23°22.0	312°50.6	7.6	-23°05.3	-1.5	57.0
10	329°54.6	-23°21.9	327°17.3	7.7	-23°06.8	-1.4	57.0
11	344°54.3	-23°21.9	341°43.9	7.7	-23°08.1	-1.2	56.9
12	359°54.0	-23°21.8	356°10.6	7.7	-23°09.2	-1.1	56.9
13	14°53.7	-23°21.7	10°37.3	7.7	-23°10.3	-1.0	56.9
14	29°53.4	-23°21.6	25°04.0	7.7	-23°11.1	-0.8	56.9
15	44°53.1	-23°21.5	39°30.8	7.8	-23°11.9	-0.7	56.8
16	59°52.8	-23°21.4	53°57.5	7.8	-23°12.5	-0.6	56.8
17	74°52.4	-23°21.3	68°24.3	7.8	-23°13.0	-0.4	56.8
18	89°52.1	-23°21.2	82°51.2	7.8	-23°13.4	-0.3	56.8
19	104°51.8	-23°21.2	97°18.0	7.9	-23°13.6	-0.2	56.7
20	119°51.5	-23°21.1	111°44.9	7.9	-23°13.7	-0.0	56.7
21	134°51.2	-23°21.0	126°11.8	7.9	-23°13.6	0.1	56.7
22	149°50.9	-23°20.9	140°38.8	8.0	-23°13.4	0.2	56.7
23	164°50.6	-23°20.8	155°05.8	8.0	-23°13.1	0.4	56.6
	SD.=16.3	d=0.1			S.D.=15.6		

Lat.	Twilight		Sunrise	Sunset	Twilight	
	Naut.	Civil			Civil	Naut.
72	08:27	10:57	–:–	–:–	13:03	15:33
70	08:07	09:55	–:–	–:–	14:05	15:53
68	07:51	09:20	–:–	–:–	14:40	16:09
66	07:38	08:55	10:35	13:25	15:05	16:22
64	07:27	08:35	09:53	14:07	15:25	16:33
62	07:17	08:19	09:25	14:35	15:41	16:43
60	07:09	08:06	09:03	14:57	15:54	16:51
58	07:01	07:54	08:46	15:14	16:06	16:59
56	06:55	07:44	08:31	15:29	16:16	17:05
54	06:48	07:35	08:18	15:41	16:25	17:12
52	06:43	07:26	08:07	15:53	16:33	17:17
50	06:37	07:19	07:57	16:02	16:41	17:22
45	06:26	07:03	07:37	16:23	16:57	17:34
40	06:15	06:49	07:20	16:40	17:11	17:45
35	06:06	06:38	07:06	16:54	17:22	17:54
30	05:57	06:27	06:53	17:07	17:33	18:03
20	05:41	06:08	06:32	17:28	17:52	18:19
10	05:24	05:51	06:14	17:46	18:09	18:35
0	05:07	05:34	05:56	18:04	18:26	18:52
-10	04:48	05:16	05:39	18:21	18:44	19:11
-20	04:26	04:55	05:20	18:40	19:05	19:34
-30	03:57	04:30	04:58	19:02	19:30	20:03
-35	03:38	04:15	04:45	19:15	19:45	20:22
-40	03:15	03:57	04:29	19:30	20:03	20:45
-45	02:44	03:34	04:11	19:48	20:26	21:15
-50	01:59	03:04	03:49	20:11	20:55	22:01
-52	01:31	02:49	03:38	20:22	21:10	22:29
-54	00:44	02:31	03:26	20:34	21:28	23:15
-56	–:–	02:09	03:11	20:48	21:51	–:–
-58	–:–	01:39	02:55	21:05	22:20	–:–
-60	–:–	00:49	02:34	21:25	23:10	–:–

Lat.	Moonrise			Moonset		
	Tue	Wed	Thu	Tue	Wed	Thu
72	–:–	–:–	–:–	–:–	–:–	–:–
70	09:31	–:–	–:–	11:07	–:–	–:–
68	08:23	–:–	–:–	12:16	–:–	–:–
66	07:47	09:37	11:13	12:52	12:57	13:17
64	07:21	08:58	10:18	13:18	13:36	14:12
62	07:01	08:31	09:46	13:39	14:04	14:45
60	06:45	08:10	09:21	13:56	14:25	15:09
58	06:32	07:53	09:02	14:10	14:43	15:28
56	06:20	07:38	08:46	14:22	14:58	15:45
54	06:10	07:26	08:32	14:33	15:10	15:58
52	06:01	07:15	08:20	14:42	15:22	16:10
50	05:53	07:05	08:10	14:51	15:32	16:21
45	05:35	06:44	07:48	15:09	15:53	16:43
40	05:21	06:28	07:30	15:24	16:10	17:01
35	05:10	06:14	07:15	15:36	16:24	17:16
30	04:59	06:02	07:02	15:47	16:36	17:29
20	04:42	05:41	06:40	16:06	16:58	17:52
10	04:26	05:24	06:20	16:23	17:16	18:11
0	04:12	05:07	06:03	16:38	17:34	18:29
-10	03:58	04:51	05:45	16:54	17:51	18:47
-20	03:43	04:33	05:26	17:10	18:10	19:06
-30	03:26	04:13	05:04	17:29	18:31	19:29
-35	03:16	04:01	04:51	17:41	18:44	19:42
-40	03:05	03:48	04:36	17:54	18:58	19:57
-45	02:51	03:32	04:19	18:09	19:15	20:14
-50	02:35	03:12	03:57	18:27	19:36	20:36
-52	02:28	03:03	03:47	18:36	19:47	20:47
-54	02:20	02:53	03:35	18:46	19:58	20:59
-56	02:10	02:41	03:22	18:57	20:11	21:13
-58	01:60	02:28	03:07	19:10	20:26	21:28
-60	01:48	02:12	02:48	19:26	20:44	21:47

Day	Sun			Moon		
	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
24	00:51	00:36	11:59	10:25	22:52	28(3%)
25	00:21	00:06	11:59	11:20	23:48	29(1%)
26	00:09	00:24	12:00	12:15	00:43	0(0%)

December 27, 28 ,29 (Fri., Sat., Sun.)

	Aries	Venus		Mars		Jupiter		Saturn	
Fri	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	95°11.4	143°59.0	-19°59.6	222°24.4	-18°37.3	179°11.0	-23°13.5	162°41.6	-21°46.1
1	110°13.8	158°58.3	-19°58.8	237°25.2	-18°37.8	194°12.8	-23°13.5	177°43.8	-21°46.0
2	125°16.3	173°57.6	-19°57.9	252°25.9	-18°38.2	209°14.7	-23°13.4	192°45.9	-21°46.0
3	140°18.8	188°56.9	-19°57.1	267°26.7	-18°38.6	224°16.5	-23°13.4	207°48.1	-21°45.9
4	155°21.2	203°56.2	-19°56.3	282°27.5	-18°39.0	239°18.3	-23°13.4	222°50.3	-21°45.9
5	170°23.7	218°55.5	-19°55.5	297°28.2	-18°39.5	254°20.2	-23°13.4	237°52.4	-21°45.9
6	185°26.1	233°54.9	-19°54.7	312°29.0	-18°39.9	269°22.0	-23°13.4	252°54.6	-21°45.8
7	200°28.6	248°54.2	-19°53.9	327°29.7	-18°40.3	284°23.9	-23°13.3	267°56.7	-21°45.8
8	215°31.1	263°53.5	-19°53.1	342°30.5	-18°40.7	299°25.7	-23°13.3	282°58.9	-21°45.7
9	230°33.5	278°52.8	-19°52.3	357°31.2	-18°41.2	314°27.5	-23°13.3	298°01.0	-21°45.7
10	245°36.0	293°52.1	-19°51.4	12°32.0	-18°41.6	329°29.4	-23°13.3	313°03.2	-21°45.7
11	260°38.5	308°51.4	-19°50.6	27°32.7	-18°42.0	344°31.2	-23°13.3	328°05.3	-21°45.6
12	275°40.9	323°50.8	-19°49.8	42°33.5	-18°42.4	359°33.0	-23°13.2	343°07.5	-21°45.6
13	290°43.4	338°50.1	-19°49.0	57°34.2	-18°42.9	14°34.9	-23°13.2	358°09.7	-21°45.5
14	305°45.9	353°49.4	-19°48.2	72°35.0	-18°43.3	29°36.7	-23°13.2	13°11.8	-21°45.5
15	320°48.3	8°48.7	-19°47.3	87°35.7	-18°43.7	44°38.6	-23°13.2	28°14.0	-21°45.4
16	335°50.8	23°48.0	-19°46.5	102°36.5	-18°44.1	59°40.4	-23°13.2	43°16.1	-21°45.4
17	350°53.3	38°47.4	-19°45.7	117°37.2	-18°44.6	74°42.2	-23°13.1	58°18.3	-21°45.4
18	5°55.7	53°46.7	-19°44.9	132°38.0	-18°45.0	89°44.1	-23°13.1	73°20.4	-21°45.3
19	20°58.2	68°46.0	-19°44.0	147°38.7	-18°45.4	104°45.9	-23°13.1	88°22.6	-21°45.3
20	36°00.6	83°45.3	-19°43.2	162°39.5	-18°45.8	119°47.7	-23°13.1	103°24.7	-21°45.2
21	51°03.1	98°44.7	-19°42.4	177°40.2	-18°46.2	134°49.6	-23°13.1	118°26.9	-21°45.2
22	66°05.6	113°44.0	-19°41.6	192°41.0	-18°46.7	149°51.4	-23°13.0	133°29.1	-21°45.2
23	81°08.0	128°43.3	-19°40.7	207°41.7	-18°47.1	164°53.3	-23°13.0	148°31.2	-21°45.1
Mer.pass.:17:36		v-0.7 d0.8 m-3.9		v0.8 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Sat	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	96°10.5	143°42.6	-19°39.9	222°42.5	-18°47.5	179°55.1	-23°13.0	163°33.4	-21°45.1
1	111°13.0	158°42.0	-19°39.1	237°43.2	-18°47.9	194°56.9	-23°13.0	178°35.5	-21°45.0
2	126°15.4	173°41.3	-19°38.2	252°43.9	-18°48.3	209°58.8	-23°13.0	193°37.7	-21°45.0
3	141°17.9	188°40.6	-19°37.4	267°44.7	-18°48.8	225°00.6	-23°12.9	208°39.8	-21°45.0
4	156°20.4	203°39.9	-19°36.6	282°45.4	-18°49.2	240°02.4	-23°12.9	223°42.0	-21°44.9
5	171°22.8	218°39.3	-19°35.7	297°46.2	-18°49.6	255°04.3	-23°12.9	238°44.1	-21°44.9
6	186°25.3	233°38.6	-19°34.9	312°46.9	-18°50.0	270°06.1	-23°12.9	253°46.3	-21°44.8
7	201°27.7	248°37.9	-19°34.1	327°47.7	-18°50.4	285°07.9	-23°12.8	268°48.5	-21°44.8
8	216°30.2	263°37.3	-19°33.2	342°48.4	-18°50.9	300°09.8	-23°12.8	283°50.6	-21°44.7
9	231°32.7	278°36.6	-19°32.4	357°49.2	-18°51.3	315°11.6	-23°12.8	298°52.8	-21°44.7
10	246°35.1	293°35.9	-19°31.5	12°49.9	-18°51.7	330°13.5	-23°12.8	313°54.9	-21°44.7
11	261°37.6	308°35.3	-19°30.7	27°50.7	-18°52.1	345°15.3	-23°12.8	328°57.1	-21°44.6
12	276°40.1	323°34.6	-19°29.9	42°51.4	-18°52.5	0°17.1	-23°12.7	343°59.2	-21°44.6
13	291°42.5	338°33.9	-19°29.0	57°52.2	-18°53.0	15°19.0	-23°12.7	359°01.4	-21°44.5
14	306°45.0	353°33.3	-19°28.2	72°52.9	-18°53.4	30°20.8	-23°12.7	14°03.5	-21°44.5
15	321°47.5	8°32.6	-19°27.3	87°53.7	-18°53.8	45°22.6	-23°12.7	29°05.7	-21°44.5
16	336°49.9	23°31.9	-19°26.5	102°54.4	-18°54.2	60°24.5	-23°12.7	44°07.9	-21°44.4
17	351°52.4	38°31.3	-19°25.6	117°55.1	-18°54.6	75°26.3	-23°12.6	59°10.0	-21°44.4
18	6°54.9	53°30.6	-19°24.8	132°55.9	-18°55.0	90°28.2	-23°12.6	74°12.2	-21°44.3
19	21°57.3	68°29.9	-19°23.9	147°56.6	-18°55.4	105°30.0	-23°12.6	89°14.3	-21°44.3
20	36°59.8	83°29.3	-19°23.1	162°57.4	-18°55.9	120°31.8	-23°12.6	104°16.5	-21°44.2
21	52°02.2	98°28.6	-19°22.2	177°58.1	-18°56.3	135°33.7	-23°12.5	119°18.6	-21°44.2
22	67°04.7	113°28.0	-19°21.4	192°58.9	-18°56.7	150°35.5	-23°12.5	134°20.8	-21°44.2
23	82°07.2	128°27.3	-19°20.5	207°59.6	-18°57.1	165°37.3	-23°12.5	149°22.9	-21°44.1
Mer.pass.:17:32		v-0.7 d0.8 m-3.9		v0.7 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Sun	**GHA**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**	**GHA**	**Dec**
0	97°09.6	143°26.6	-19°19.7	223°00.4	-18°57.5	180°39.2	-23°12.5	164°25.1	-21°44.1
1	112°12.1	158°26.0	-19°18.8	238°01.1	-18°57.9	195°41.0	-23°12.5	179°27.2	-21°44.0
2	127°14.6	173°25.3	-19°18.0	253°01.8	-18°58.4	210°42.9	-23°12.4	194°29.4	-21°44.0
3	142°17.0	188°24.7	-19°17.1	268°02.6	-18°58.8	225°44.7	-23°12.4	209°31.6	-21°44.0
4	157°19.5	203°24.0	-19°16.3	283°03.3	-18°59.2	240°46.5	-23°12.4	224°33.7	-21°43.9
5	172°22.0	218°23.4	-19°15.4	298°04.1	-18°59.6	255°48.4	-23°12.4	239°35.9	-21°43.9
6	187°24.4	233°22.7	-19°14.6	313°04.8	-19°00.0	270°50.2	-23°12.3	254°38.0	-21°43.8
7	202°26.9	248°22.0	-19°13.7	328°05.6	-19°00.4	285°52.0	-23°12.3	269°40.2	-21°43.8
8	217°29.4	263°21.4	-19°12.8	343°06.3	-19°00.8	300°53.9	-23°12.3	284°42.3	-21°43.7
9	232°31.8	278°20.7	-19°12.0	358°07.0	-19°01.2	315°55.7	-23°12.3	299°44.5	-21°43.7
10	247°34.3	293°20.1	-19°11.1	13°07.8	-19°01.7	330°57.6	-23°12.3	314°46.6	-21°43.7
11	262°36.7	308°19.4	-19°10.2	28°08.5	-19°02.1	345°59.4	-23°12.2	329°48.8	-21°43.6
12	277°39.2	323°18.8	-19°09.4	43°09.3	-19°02.5	1°01.2	-23°12.2	344°50.9	-21°43.6
13	292°41.7	338°18.1	-19°08.5	58°10.0	-19°02.9	16°03.1	-23°12.2	359°53.1	-21°43.5
14	307°44.1	353°17.5	-19°07.7	73°10.8	-19°03.3	31°04.9	-23°12.2	14°55.3	-21°43.5
15	322°46.6	8°16.8	-19°06.8	88°11.5	-19°03.7	46°06.7	-23°12.1	29°57.4	-21°43.5
16	337°49.1	23°16.2	-19°05.9	103°12.2	-19°04.1	61°08.6	-23°12.1	44°59.6	-21°43.4
17	352°51.5	38°15.5	-19°05.1	118°13.0	-19°04.5	76°10.4	-23°12.1	60°01.7	-21°43.4
18	7°54.0	53°14.9	-19°04.2	133°13.7	-19°04.9	91°12.3	-23°12.1	75°03.9	-21°43.3
19	22°56.5	68°14.2	-19°03.3	148°14.5	-19°05.4	106°14.1	-23°12.1	90°06.0	-21°43.3
20	37°58.9	83°13.6	-19°02.4	163°15.2	-19°05.8	121°15.9	-23°12.0	105°08.2	-21°43.2
21	53°01.4	98°12.9	-19°01.6	178°15.9	-19°06.2	136°17.8	-23°12.0	120°10.3	-21°43.2
22	68°03.9	113°12.3	-19°00.7	193°16.7	-19°06.6	151°19.6	-23°12.0	135°12.5	-21°43.2
23	83°06.3	128°11.7	-18°59.8	208°17.4	-19°07.0	166°21.4	-23°12.0	150°14.6	-21°43.1
Mer.pass.:17:28		v-0.7 d0.9 m-3.9		v0.7 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	**Dec**
Alpheratz	357°38.9	29°12.1
Ankaa	353°11.2	-42°12.2
Schedar	349°35.4	56°39.0
Diphda	348°51.2	-17°52.9
Achernar	335°23.2	-57°08.5
Hamal	327°55.6	23°33.4
Polaris	315°30.3	89°21.0
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°09.9
Mirfak	308°33.5	49°55.9
Aldebaran	290°43.9	16°32.9
Rigel	281°07.4	-8°10.9
Capella	280°27.4	46°01.0
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.3
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.1	7°24.5
Canopus	263°53.6	-52°42.5
Sirius	258°29.3	-16°44.5
Adara	255°08.6	-29°00.0
Procyon	244°54.6	5°10.5
Pollux	243°21.8	27°58.5
Avior	234°15.7	-59°34.3
Suhail	222°48.8	-43°30.6
Miaplacidus	221°38.1	-69°47.7
Alphard	217°51.4	-8°44.7
Regulus	207°38.5	11°52.1
Dubhe	193°45.9	61°38.4
Denebola	182°29.0	14°27.6
Gienah	175°47.7	-17°39.0
Acrux	173°04.4	-63°12.2
Gacrux	171°56.0	-57°13.1
Alioth	166°16.8	55°50.9
Spica	158°26.6	-11°15.7
Alcaid	152°55.5	49°12.7
Hadar	148°41.8	-60°27.7
Menkent	148°02.5	-36°27.8
Arcturus	145°51.7	19°05.0
Rigil Kent.	139°46.0	-60°54.6
Zubenelg.	137°00.7	-16°07.3
Kochab	137°20.8	74°04.3
Alphecca	126°07.5	26°38.9
Antares	112°21.1	-26°28.3
Atria	107°19.4	-69°03.5
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°06.9
Rasalhague	96°02.6	12°32.9
Etamin	90°44.6	51°29.2
Kaus Aust.	83°38.3	-34°22.4
Vega	80°36.4	38°48.2
Nunki	75°53.1	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.3
Deneb	49°28.8	45°21.2
Enif	33°43.0	9°58.0
Alnair	27°38.4	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.2	28°11.5
Markab	13°34.0	15°18.8

2019/12/	**SHA**	**Mer.pass**
Venus	48°47.6	14:25
Mars	127°13.1	09:10
Jupiter	83°59.6	12:02
Saturn	67°30.3	13:07

2019/12/	**SHA**	**Mer.pass**
Venus	47°32.1	14:26
Mars	126°32.0	09:09
Jupiter	83°44.6	11:59
Saturn	67°22.9	13:04

2019/12/	**SHA**	**Mer.pass**
Venus	46°17.0	14:27
Mars	125°50.7	09:08
Jupiter	83°29.5	11:56
Saturn	67°15.5	13:00

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Fri	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°50.3	-23°20.7	169°32.8	8.0	-23°12.7	0.5	56.6
1	194°50.0	-23°20.6	183°59.9	8.1	-23°12.1	0.6	56.6
2	209°49.7	-23°20.5	198°26.9	8.1	-23°11.4	0.8	56.6
3	224°49.3	-23°20.4	212°54.1	8.2	-23°10.5	0.9	56.5
4	239°49.0	-23°20.3	227°21.3	8.2	-23°09.6	1.0	56.5
5	254°48.7	-23°20.2	241°48.5	8.2	-23°08.5	1.2	56.5
6	269°48.4	-23°20.1	256°15.7	8.3	-23°07.2	1.3	56.5
7	284°48.1	-23°20.0	270°43.0	8.3	-23°05.9	1.4	56.4
8	299°47.8	-23°19.9	285°10.4	8.4	-23°04.4	1.6	56.4
9	314°47.5	-23°19.8	299°37.8	8.4	-23°02.8	1.7	56.4
10	329°47.2	-23°19.7	314°05.2	8.5	-23°01.0	1.8	56.4
11	344°46.9	-23°19.6	328°32.7	8.5	-22°59.2	1.9	56.3
12	359°46.6	-23°19.5	343°00.3	8.6	-22°57.2	2.1	56.3
13	14°46.3	-23°19.4	357°27.8	8.6	-22°55.1	2.2	56.3
14	29°45.9	-23°19.3	11°55.5	8.7	-22°52.8	2.3	56.3
15	44°45.6	-23°19.2	26°23.2	8.7	-22°50.4	2.4	56.2
16	59°45.3	-23°19.1	40°50.9	8.8	-22°48.0	2.6	56.2
17	74°45.0	-23°19.0	55°18.7	8.8	-22°45.3	2.7	56.2
18	89°44.7	-23°18.9	69°46.6	8.9	-22°42.6	2.8	56.2
19	104°44.4	-23°18.8	84°14.5	8.9	-22°39.7	2.9	56.1
20	119°44.1	-23°18.6	98°42.4	9.0	-22°36.8	3.0	56.1
21	134°43.8	-23°18.5	113°10.5	9.1	-22°33.7	3.2	56.1
22	149°43.5	-23°18.4	127°38.6	9.1	-22°30.5	3.3	56.1
23	164°43.2	-23°18.3	142°06.7	9.2	-22°27.1	3.4	56.0
	SD.=16.3	d=0.1			S.D.=15.4		

Sat	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°42.9	-23°18.2	156°34.9	9.2	-22°23.7	3.5	56.0
1	194°42.6	-23°18.1	171°03.2	9.3	-22°20.1	3.6	56.0
2	209°42.2	-23°18.0	185°31.5	9.4	-22°16.4	3.7	56.0
3	224°41.9	-23°17.9	199°59.9	9.4	-22°12.6	3.9	55.9
4	239°41.6	-23°17.7	214°28.3	9.5	-22°08.7	4.0	55.9
5	254°41.3	-23°17.6	228°56.8	9.5	-22°04.7	4.1	55.9
6	269°41.0	-23°17.5	243°25.4	9.6	-22°00.5	4.2	55.9
7	284°40.7	-23°17.4	257°54.1	9.7	-21°56.3	4.3	55.8
8	299°40.4	-23°17.3	272°22.8	9.7	-21°51.9	4.4	55.8
9	314°40.1	-23°17.1	286°51.5	9.8	-21°47.4	4.5	55.8
10	329°39.8	-23°17.0	301°20.4	9.9	-21°42.9	4.6	55.8
11	344°39.5	-23°16.9	315°49.3	9.9	-21°38.2	4.7	55.7
12	359°39.2	-23°16.8	330°18.3	10.0	-21°33.4	4.9	55.7
13	14°38.9	-23°16.6	344°47.3	10.1	-21°28.5	5.0	55.7
14	29°38.6	-23°16.5	359°16.4	10.1	-21°23.4	5.1	55.7
15	44°38.2	-23°16.4	13°45.6	10.2	-21°18.3	5.2	55.6
16	59°37.9	-23°16.3	28°14.9	10.3	-21°13.1	5.3	55.6
17	74°37.6	-23°16.1	42°44.2	10.4	-21°07.8	5.4	55.6
18	89°37.3	-23°16.0	57°13.6	10.4	-21°02.4	5.5	55.6
19	104°37.0	-23°15.9	71°43.0	10.5	-20°56.8	5.6	55.6
20	119°36.7	-23°15.8	86°12.6	10.6	-20°51.2	5.7	55.5
21	134°36.4	-23°15.6	100°42.2	10.6	-20°45.5	5.8	55.5
22	149°36.1	-23°15.5	115°11.9	10.7	-20°39.6	5.9	55.5
23	164°35.8	-23°15.4	129°41.6	10.8	-20°33.7	6.0	55.5
	SD.=16.3	d=0.1			S.D.=15.3		

Sun	**GHA**	**Dec**	**GHA**	ν	**Dec**	**d**	**HP**
0	179°35.5	-23°15.2	144°11.4	10.9	-20°27.7	6.1	55.4
1	194°35.2	-23°15.1	158°41.3	10.9	-20°21.6	6.2	55.4
2	209°34.9	-23°15.0	173°11.3	11.0	-20°15.4	6.3	55.4
3	224°34.6	-23°14.8	187°41.3	11.1	-20°09.1	6.4	55.4
4	239°34.3	-23°14.7	202°11.4	11.1	-20°02.7	6.4	55.4
5	254°34.0	-23°14.6	216°41.6	11.2	-19°56.2	6.5	55.3
6	269°33.7	-23°14.4	231°11.9	11.3	-19°49.6	6.6	55.3
7	284°33.3	-23°14.3	245°42.2	11.4	-19°42.9	6.7	55.3
8	299°33.0	-23°14.1	260°12.6	11.4	-19°36.2	6.8	55.3
9	314°32.7	-23°14.0	274°43.1	11.5	-19°29.3	6.9	55.2
10	329°32.4	-23°13.9	289°13.6	11.6	-19°22.4	7.0	55.2
11	344°32.1	-23°13.7	303°44.2	11.7	-19°15.3	7.1	55.2
12	359°31.8	-23°13.6	318°14.9	11.7	-19°08.2	7.2	55.2
13	14°31.5	-23°13.4	332°45.7	11.8	-19°01.0	7.2	55.2
14	29°31.2	-23°13.3	347°16.5	11.9	-18°53.8	7.3	55.1
15	44°30.9	-23°13.1	1°47.4	11.9	-18°46.4	7.4	55.1
16	59°30.6	-23°13.0	16°18.4	12.0	-18°39.0	7.5	55.1
17	74°30.3	-23°12.8	30°49.5	12.1	-18°31.4	7.6	55.1
18	89°30.0	-23°12.7	45°20.6	12.2	-18°23.8	7.6	55.1
19	104°29.7	-23°12.5	59°51.8	12.2	-18°16.1	7.7	55.0
20	119°29.4	-23°12.4	74°23.1	12.3	-18°08.4	7.8	55.0
21	134°29.1	-23°12.2	88°54.4	12.4	-18°00.5	7.9	55.0
22	149°28.8	-23°12.1	103°25.8	12.4	-17°52.6	8.0	55.0
23	164°28.5	-23°11.9	117°57.3	12.5	-17°44.6	8.0	55.0
	SD.=16.3	d=0.1			S.D.=15.1		

	Twilight					**Twilight**
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:27	10:53	–:–	–:–	13:10	15:36
70	08:07	09:54	–:–	–:–	14:09	15:56
68	07:51	09:20	–:–	–:–	14:43	16:12
66	07:38	08:55	10:34	13:29	15:08	16:25
64	07:27	08:35	09:53	14:10	15:28	16:36
62	07:18	08:20	09:25	14:38	15:43	16:45
60	07:09	08:06	09:03	14:59	15:57	16:54
58	07:02	07:55	08:46	15:17	16:08	17:01
56	06:55	07:44	08:32	15:31	16:19	17:08
54	06:49	07:35	08:19	15:44	16:28	17:14
52	06:44	07:27	08:08	15:55	16:36	17:19
50	06:38	07:20	07:58	16:05	16:43	17:25
45	06:27	07:04	07:38	16:25	16:59	17:36
40	06:16	06:50	07:21	16:42	17:12	17:47
35	06:07	06:39	07:07	16:56	17:24	17:56
30	05:58	06:28	06:55	17:08	17:35	18:04
20	05:42	06:09	06:33	17:29	17:53	18:21
10	05:26	05:52	06:15	17:48	18:11	18:37
0	05:09	05:35	05:58	18:05	18:28	18:54
-10	04:50	05:17	05:40	18:23	18:46	19:13
-20	04:28	04:57	05:21	18:41	19:06	19:35
-30	03:59	04:32	04:59	19:03	19:31	20:04
-35	03:40	04:17	04:46	19:16	19:46	20:23
-40	03:17	03:59	04:31	19:31	20:04	20:46
-45	02:47	03:36	04:13	19:49	20:26	21:16
-50	02:01	03:07	03:51	20:11	20:56	22:01
-52	01:34	02:52	03:40	20:22	21:11	22:28
-54	00:49	02:34	03:28	20:34	21:29	23:12
-56	–:–	02:12	03:14	20:49	21:50	–:–
-58	–:–	01:42	02:57	21:05	22:20	–:–
-60	–:–	00:54	02:37	21:25	23:07	–:–

	Moonrise			**Moonset**		
Lat.	Fri	Sat	Sun	Fri	Sat	Sun
72	–:–	–:–	–:–	–:–	–:–	–:–
70	–:–	–:–	13:36	–:–	–:–	16:22
68	–:–	13:13	12:45	–:–	15:01	17:11
66	12:00	12:11	12:13	14:24	16:02	17:43
64	11:10	11:37	11:50	15:14	16:36	18:06
62	10:39	11:11	11:31	15:45	17:01	18:24
60	10:15	10:51	11:15	16:09	17:21	18:39
58	09:56	10:35	11:02	16:27	17:37	18:52
56	09:40	10:21	10:51	16:43	17:51	19:03
54	09:27	10:09	10:40	16:57	18:02	19:12
52	09:15	09:58	10:31	17:08	18:13	19:21
50	09:04	09:48	10:23	17:19	18:22	19:28
45	08:42	09:28	10:06	17:40	18:42	19:45
40	08:25	09:12	09:52	17:58	18:57	19:58
35	08:10	08:58	09:40	18:13	19:11	20:09
30	07:57	08:46	09:30	18:25	19:22	20:19
20	07:35	08:25	09:12	18:47	19:42	20:36
10	07:15	08:07	08:56	19:06	19:59	20:50
0	06:58	07:51	08:41	19:23	20:15	21:04
-10	06:40	07:34	08:26	19:41	20:31	21:18
-20	06:20	07:16	08:10	19:60	20:48	21:32
-30	05:58	06:55	07:52	20:21	21:07	21:48
-35	05:45	06:43	07:41	20:33	21:19	21:58
-40	05:31	06:29	07:29	20:48	21:32	22:09
-45	05:13	06:12	07:14	21:05	21:47	22:21
-50	04:51	05:52	06:57	21:26	22:05	22:37
-52	04:40	05:42	06:48	21:36	22:14	22:44
-54	04:28	05:31	06:39	21:47	22:24	22:52
-56	04:15	05:18	06:28	21:60	22:35	23:01
-58	03:59	05:04	06:16	22:15	22:48	23:11
-60	03:40	04:46	06:02	22:32	23:02	23:22

	Sun			**Moon**		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
27	00:39	00:54	12:00	13:10	00:43	1(2%)
28	01:09	01:23	12:01	14:03	01:37	2(6%)
29	01:38	01:53	12:01	14:52	02:28	3(11%)

December 30, 31 ,01 (Mon., Tue., Wed.)

	Aries	Venus		Mars		Jupiter		Saturn	
Mon	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	98°08.8	143°11.0	-18°58.9	223°18.2	-19°07.4	181°23.3	-23°11.9	165°16.8	-21°43.1
1	113°11.2	158°10.4	-18°58.1	238°18.9	-19°07.8	196°25.1	-23°11.9	180°18.9	-21°43.0
2	128°13.7	173°09.7	-18°57.2	253°19.6	-19°08.2	211°27.0	-23°11.9	195°21.1	-21°43.0
3	143°16.2	188°09.1	-18°56.3	268°20.4	-19°08.6	226°28.8	-23°11.9	210°23.3	-21°43.0
4	158°18.6	203°08.4	-18°55.4	283°21.1	-19°09.0	241°30.6	-23°11.8	225°25.4	-21°42.9
5	173°21.1	218°07.8	-18°54.6	298°21.9	-19°09.4	256°32.5	-23°11.8	240°27.6	-21°42.9
6	188°23.6	233°07.2	-18°53.7	313°22.6	-19°09.8	271°34.3	-23°11.8	255°29.7	-21°42.8
7	203°26.0	248°06.5	-18°52.8	328°23.3	-19°10.3	286°36.1	-23°11.8	270°31.9	-21°42.8
8	218°28.5	263°05.9	-18°51.9	343°24.1	-19°10.7	301°38.0	-23°11.8	285°34.0	-21°42.7
9	233°31.0	278°05.2	-18°51.0	358°24.8	-19°11.1	316°39.8	-23°11.7	300°36.2	-21°42.7
10	248°33.4	293°04.6	-18°50.1	13°25.5	-19°11.5	331°41.7	-23°11.7	315°38.3	-21°42.7
11	263°35.9	308°04.0	-18°49.3	28°26.3	-19°11.9	346°43.5	-23°11.7	330°40.5	-21°42.6
12	278°38.3	323°03.3	-18°48.4	43°27.0	-19°12.3	1°45.3	-23°11.7	345°42.6	-21°42.6
13	293°40.8	338°02.7	-18°47.5	58°27.8	-19°12.7	16°47.2	-23°11.6	0°44.8	-21°42.5
14	308°43.3	353°02.1	-18°46.6	73°28.5	-19°13.1	31°49.0	-23°11.6	15°46.9	-21°42.5
15	323°45.7	8°01.4	-18°45.7	88°29.2	-19°13.5	46°50.8	-23°11.6	30°49.1	-21°42.4
16	338°48.2	23°00.8	-18°44.8	103°30.0	-19°13.9	61°52.7	-23°11.6	45°51.3	-21°42.4
17	353°50.7	38°00.2	-18°43.9	118°30.7	-19°14.3	76°54.5	-23°11.5	60°53.4	-21°42.4
18	8°53.1	52°59.5	-18°43.0	133°31.4	-19°14.7	91°56.4	-23°11.5	75°55.6	-21°42.3
19	23°55.6	67°58.9	-18°42.2	148°32.2	-19°15.1	106°58.2	-23°11.5	90°57.7	-21°42.3
20	38°58.1	82°58.3	-18°41.3	163°32.9	-19°15.5	122°00.0	-23°11.5	105°59.9	-21°42.2
21	54°00.5	97°57.6	-18°40.4	178°33.7	-19°15.9	137°01.9	-23°11.4	121°02.0	-21°42.2
22	69°03.0	112°57.0	-18°39.5	193°34.4	-19°16.3	152°03.7	-23°11.4	136°04.2	-21°42.2
23	84°05.5	127°56.4	-18°38.6	208°35.1	-19°16.7	167°05.5	-23°11.4	151°06.3	-21°42.1
Mer.pass.:17:24		v-0.6 d0.9 m-3.9		v0.7 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Tue	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	99°07.9	142°55.7	-18°37.7	223°35.9	-19°17.1	182°07.4	-23°11.4	166°08.5	-21°42.1
1	114°10.4	157°55.1	-18°36.8	238°36.6	-19°17.5	197°09.2	-23°11.3	181°10.6	-21°42.0
2	129°12.8	172°54.5	-18°35.9	253°37.3	-19°17.9	212°11.1	-23°11.3	196°12.8	-21°42.0
3	144°15.3	187°53.9	-18°35.0	268°38.1	-19°18.3	227°12.9	-23°11.3	211°14.9	-21°41.9
4	159°17.8	202°53.2	-18°34.1	283°38.8	-19°18.7	242°14.7	-23°11.3	226°17.1	-21°41.9
5	174°20.2	217°52.6	-18°33.2	298°39.5	-19°19.1	257°16.6	-23°11.3	241°19.2	-21°41.9
6	189°22.7	232°52.0	-18°32.3	313°40.3	-19°19.5	272°18.4	-23°11.2	256°21.4	-21°41.8
7	204°25.2	247°51.4	-18°31.4	328°41.0	-19°19.9	287°20.3	-23°11.2	271°23.6	-21°41.8
8	219°27.6	262°50.7	-18°30.5	343°41.7	-19°20.3	302°22.1	-23°11.2	286°25.7	-21°41.7
9	234°30.1	277°50.1	-18°29.6	358°42.5	-19°20.7	317°23.9	-23°11.2	301°27.9	-21°41.7
10	249°32.6	292°49.5	-18°28.7	13°43.2	-19°21.1	332°25.8	-23°11.1	316°30.0	-21°41.6
11	264°35.0	307°48.9	-18°27.8	28°43.9	-19°21.5	347°27.6	-23°11.1	331°32.2	-21°41.6
12	279°37.5	322°48.2	-18°26.9	43°44.7	-19°21.9	2°29.4	-23°11.1	346°34.3	-21°41.6
13	294°40.0	337°47.6	-18°26.0	58°45.4	-19°22.3	17°31.3	-23°11.1	1°36.5	-21°41.5
14	309°42.4	352°47.0	-18°25.0	73°46.1	-19°22.7	32°33.1	-23°11.0	16°38.6	-21°41.5
15	324°44.9	7°46.4	-18°24.1	88°46.9	-19°23.1	47°35.0	-23°11.0	31°40.8	-21°41.4
16	339°47.3	22°45.8	-18°23.2	103°47.6	-19°23.5	62°36.8	-23°11.0	46°42.9	-21°41.4
17	354°49.8	37°45.2	-18°22.3	118°48.3	-19°23.9	77°38.6	-23°11.0	61°45.1	-21°41.3
18	9°52.3	52°44.5	-18°21.4	133°49.1	-19°24.3	92°40.5	-23°10.9	76°47.2	-21°41.3
19	24°54.7	67°43.9	-18°20.5	148°49.8	-19°24.7	107°42.3	-23°10.9	91°49.4	-21°41.3
20	39°57.2	82°43.3	-18°19.6	163°50.5	-19°25.1	122°44.1	-23°10.9	106°51.5	-21°41.2
21	54°59.7	97°42.7	-18°18.7	178°51.3	-19°25.5	137°46.0	-23°10.9	121°53.7	-21°41.2
22	70°02.1	112°42.1	-18°17.7	193°52.0	-19°25.9	152°47.8	-23°10.8	136°55.8	-21°41.1
23	85°04.6	127°41.5	-18°16.8	208°52.7	-19°26.3	167°49.7	-23°10.8	151°58.0	-21°41.1
Mer.pass.:17:20		v-0.6 d0.9 m-3.9		v0.7 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Wed	GHA	GHA	Dec	GHA	Dec	GHA	Dec	GHA	Dec
0	100°07.1	142°40.8	-18°15.9	223°53.5	-19°26.7	182°51.5	-23°10.8	167°00.2	-21°41.0
1	115°09.5	157°40.2	-18°15.0	238°54.2	-19°27.1	197°53.3	-23°10.8	182°02.3	-21°41.0
2	130°12.0	172°39.6	-18°14.1	253°54.9	-19°27.5	212°55.2	-23°10.7	197°04.5	-21°41.0
3	145°14.4	187°39.0	-18°13.2	268°55.7	-19°27.9	227°57.0	-23°10.7	212°06.6	-21°40.9
4	160°16.9	202°38.4	-18°12.2	283°56.4	-19°28.3	242°58.8	-23°10.7	227°08.8	-21°40.9
5	175°19.4	217°37.8	-18°11.3	298°57.1	-19°28.7	258°00.7	-23°10.7	242°10.9	-21°40.8
6	190°21.8	232°37.2	-18°10.4	313°57.9	-19°29.1	273°02.5	-23°10.6	257°13.1	-21°40.8
7	205°24.3	247°36.6	-18°09.5	328°58.6	-19°29.5	288°04.4	-23°10.6	272°15.2	-21°40.8
8	220°26.8	262°36.0	-18°08.5	343°59.3	-19°29.9	303°06.2	-23°10.6	287°17.4	-21°40.7
9	235°29.2	277°35.4	-18°07.6	359°00.0	-19°30.3	318°08.0	-23°10.6	302°19.5	-21°40.7
10	250°31.7	292°34.7	-18°06.7	14°00.8	-19°30.6	333°09.9	-23°10.5	317°21.7	-21°40.6
11	265°34.2	307°34.1	-18°05.8	29°01.5	-19°31.0	348°11.7	-23°10.5	332°23.8	-21°40.6
12	280°36.6	322°33.5	-18°04.8	44°02.2	-19°31.4	3°13.6	-23°10.5	347°26.0	-21°40.5
13	295°39.1	337°32.9	-18°03.9	59°03.0	-19°31.8	18°15.4	-23°10.5	2°28.1	-21°40.5
14	310°41.6	352°32.3	-18°03.0	74°03.7	-19°32.2	33°17.2	-23°10.4	17°30.3	-21°40.5
15	325°44.0	7°31.7	-18°02.1	89°04.4	-19°32.6	48°19.1	-23°10.4	32°32.4	-21°40.4
16	340°46.5	22°31.1	-18°01.1	104°05.1	-19°33.0	63°20.9	-23°10.4	47°34.6	-21°40.4
17	355°48.9	37°30.5	-18°00.2	119°05.9	-19°33.4	78°22.7	-23°10.4	62°36.7	-21°40.3
18	10°51.4	52°29.9	-17°59.3	134°06.6	-19°33.8	93°24.6	-23°10.3	77°38.9	-21°40.3
19	25°53.9	67°29.3	-17°58.3	149°07.3	-19°34.2	108°26.4	-23°10.3	92°41.1	-21°40.2
20	40°56.3	82°28.7	-17°57.4	164°08.1	-19°34.6	123°28.3	-23°10.3	107°43.2	-21°40.2
21	55°58.8	97°28.1	-17°56.5	179°08.8	-19°35.0	138°30.1	-23°10.2	122°45.4	-21°40.2
22	71°01.3	112°27.5	-17°55.5	194°09.5	-19°35.3	153°31.9	-23°10.2	137°47.5	-21°40.1
23	86°03.7	127°26.9	-17°54.6	209°10.2	-19°35.7	168°33.8	-23°10.2	152°49.7	-21°40.1
Mer.pass.:17:16		v-0.6 d0.9 m-3.9		v0.7 d-0.4 m1.6		v1.8 d0.0 m-1.7		v2.2 d0.0 m0.6	

Stars

	SHA	Dec
Alpheratz	357°38.9	29°12.1
Ankaa	353°11.2	-42°12.2
Schedar	349°35.4	56°39.0
Diphda	348°51.2	-17°52.9
Achernar	335°23.2	-57°08.5
Hamal	327°55.6	23°33.4
Polaris	315°31.3	89°21.1
Akamar	315°14.6	-40°13.8
Menkar	314°10.1	4°09.9
Mirfak	308°33.6	49°55.9
Aldebaran	290°43.9	16°32.9
Rigel	281°07.4	-8°10.9
Capella	280°27.4	46°01.1
Bellatrix	278°26.9	6°21.9
Elnath	278°06.6	28°37.4
Alnilam	275°41.5	-1°11.5
Betelgeuse	270°56.1	7°24.5
Canopus	263°53.6	-52°42.5
Sirius	258°29.3	-16°44.5
Adara	255°08.6	-29°00.0
Procyon	244°54.6	5°10.5
Pollux	243°21.8	27°58.5
Avior	234°15.6	-59°34.3
Suhail	222°48.8	-43°30.7
Miaplacidus	221°38.1	-69°47.7
Alphard	217°51.4	-8°44.7
Regulus	207°38.5	11°52.1
Dubhe	193°45.9	61°38.4
Denebola	182°28.9	14°27.6
Gienah	175°47.6	-17°39.0
Acrux	173°04.3	-63°12.2
Gacrux	171°55.9	-57°13.1
Alioth	166°16.8	55°50.9
Spica	158°26.6	-11°15.7
Alcaid	152°55.5	49°12.7
Hadar	148°41.8	-60°27.7
Menkent	148°02.5	-36°27.8
Arcturus	145°51.6	19°05.0
Rigil Kent.	139°46.0	-60°54.6
Zubenelg.	137°00.6	-16°07.3
Kochab	137°20.7	74°04.2
Alphecca	126°07.5	26°38.9
Antares	112°21.1	-26°28.4
Atria	107°19.4	-69°03.5
Sabik	102°07.7	-15°44.8
Shaula	96°16.2	-37°06.9
Rasalhague	96°02.6	12°32.8
Etamin	90°44.6	51°29.2
Kaus Aust.	83°38.2	-34°22.4
Vega	80°36.4	38°48.2
Nunki	75°53.1	-26°16.2
Altair	62°04.3	8°55.3
Peacock	53°12.7	-56°40.3
Deneb	49°28.9	45°21.2
Enif	33°43.0	9°58.0
Alnair	27°38.4	-46°52.1
Fomalhaut	15°19.2	-29°31.2
Scheat	13°49.2	28°11.5
Markab	13°34.0	15°18.8

2019/12/	SHA	Mer.pass
Venus	45°02.2	14:28
Mars	125°09.4	09:06
Jupiter	83°14.5	11:53
Saturn	67°08.0	12:57

2019/12/	SHA	Mer.pass
Venus	43°47.8	14:29
Mars	124°27.9	09:05
Jupiter	82°59.5	11:50
Saturn	67°00.6	12:54

2020/1/1	SHA	Mer.pass
Venus	42°33.8	14:30
Mars	123°46.4	09:04
Jupiter	82°44.4	11:47
Saturn	66°53.1	12:50

Horizontal paralax	
Venus:	0.1
Mars:	0.1

h	Sun		Moon				
Mon	GHA	Dec	GHA	ν	Dec	d	HP
0	179°28.2	-23°11.8	132°28.8	12.6	-17°36.6	8.1	54.9
1	194°27.9	-23°11.6	147°00.5	12.7	-17°28.4	8.2	54.9
2	209°27.6	-23°11.5	161°32.2	12.7	-17°20.2	8.2	54.9
3	224°27.3	-23°11.3	176°03.9	12.8	-17°11.9	8.3	54.9
4	239°27.0	-23°11.2	190°35.8	12.9	-17°03.6	8.4	54.9
5	254°26.6	-23°11.0	205°07.7	12.9	-16°55.2	8.5	54.8
6	269°26.3	-23°10.9	219°39.6	13.0	-16°46.7	8.5	54.8
7	284°26.0	-23°10.7	234°11.7	13.1	-16°38.1	8.6	54.8
8	299°25.7	-23°10.5	248°43.8	13.1	-16°29.5	8.7	54.8
9	314°25.4	-23°10.4	263°15.9	13.2	-16°20.8	8.7	54.8
10	329°25.1	-23°10.2	277°48.2	13.3	-16°12.0	8.8	54.8
11	344°24.8	-23°10.1	292°20.5	13.3	-16°03.2	8.9	54.7
12	359°24.5	-23°09.9	306°52.9	13.4	-15°54.3	8.9	54.7
13	14°24.2	-23°09.7	321°25.3	13.5	-15°45.3	9.0	54.7
14	29°23.9	-23°09.6	335°57.8	13.5	-15°36.3	9.0	54.7
15	44°23.6	-23°09.4	350°30.4	13.6	-15°27.2	9.1	54.7
16	59°23.3	-23°09.2	5°03.0	13.7	-15°18.1	9.2	54.7
17	74°23.0	-23°09.1	19°35.7	13.7	-15°08.9	9.2	54.7
18	89°22.7	-23°08.9	34°08.4	13.8	-14°59.7	9.3	54.6
19	104°22.4	-23°08.7	48°41.2	13.8	-14°50.3	9.3	54.6
20	119°22.1	-23°08.6	63°14.1	13.9	-14°41.0	9.4	54.6
21	134°21.8	-23°08.4	77°47.1	14.0	-14°31.5	9.5	54.6
22	149°21.5	-23°08.2	92°20.1	14.0	-14°22.1	9.5	54.6
23	164°21.2	-23°08.1	106°53.1	14.1	-14°12.5	9.6	54.6
	SD.=16.3	d=0.2			S.D.=15.0		

Tue	GHA	Dec	GHA	ν	Dec	d	HP
0	179°20.9	-23°07.9	121°26.2	14.1	-14°02.9	9.6	54.5
1	194°20.6	-23°07.7	135°59.4	14.2	-13°53.3	9.7	54.5
2	209°20.3	-23°07.5	150°32.6	14.3	-13°43.6	9.7	54.5
3	224°20.0	-23°07.4	165°05.9	14.3	-13°33.8	9.8	54.5
4	239°19.7	-23°07.2	179°39.3	14.4	-13°24.0	9.8	54.5
5	254°19.4	-23°07.0	194°12.7	14.4	-13°14.2	9.9	54.5
6	269°19.1	-23°06.8	208°46.1	14.5	-13°04.3	9.9	54.5
7	284°18.8	-23°06.7	223°19.6	14.5	-12°54.3	10.0	54.5
8	299°18.5	-23°06.5	237°53.2	14.6	-12°44.3	10.0	54.4
9	314°18.2	-23°06.3	252°26.8	14.6	-12°34.3	10.1	54.4
10	329°17.9	-23°06.1	267°00.5	14.7	-12°24.2	10.1	54.4
11	344°17.6	-23°06.0	281°34.2	14.7	-12°14.1	10.2	54.4
12	359°17.3	-23°05.8	296°08.0	14.8	-12°03.9	10.2	54.4
13	14°17.0	-23°05.6	310°41.8	14.8	-11°53.7	10.2	54.4
14	29°16.7	-23°05.4	325°15.7	14.9	-11°43.4	10.3	54.4
15	44°16.4	-23°05.2	339°49.6	14.9	-11°33.1	10.3	54.4
16	59°16.1	-23°05.0	354°23.6	15.0	-11°22.7	10.4	54.4
17	74°15.8	-23°04.8	8°57.6	15.0	-11°12.3	10.4	54.4
18	89°15.5	-23°04.7	23°31.6	15.1	-11°01.9	10.5	54.3
19	104°15.2	-23°04.5	38°05.8	15.1	-10°51.4	10.5	54.3
20	119°14.9	-23°04.3	52°39.9	15.2	-10°40.9	10.5	54.3
21	134°14.6	-23°04.1	67°14.1	15.2	-10°30.4	10.6	54.3
22	149°14.3	-23°03.9	81°48.3	15.3	-10°19.8	10.6	54.3
23	164°14.0	-23°03.7	96°22.6	15.3	-10°09.1	10.6	54.3
	SD.=16.3	d=0.2			S.D.=14.9		

Wed	GHA	Dec	GHA	ν	Dec	d	HP
0	179°13.7	-23°03.5	110°56.9	15.3	-9°58.5	10.7	54.3
1	194°13.4	-23°03.3	125°31.3	15.4	-9°47.8	10.7	54.3
2	209°13.1	-23°03.1	140°05.7	15.4	-9°37.1	10.7	54.3
3	224°12.8	-23°03.0	154°40.1	15.5	-9°26.3	10.8	54.3
4	239°12.5	-23°02.8	169°14.6	15.5	-9°15.5	10.8	54.3
5	254°12.2	-23°02.6	183°49.1	15.5	-9°04.7	10.8	54.3
6	269°11.9	-23°02.4	198°23.7	15.6	-8°53.8	10.9	54.3
7	284°11.6	-23°02.2	212°58.3	15.6	-8°42.9	10.9	54.2
8	299°11.3	-23°02.0	227°32.9	15.6	-8°32.0	10.9	54.2
9	314°11.0	-23°01.8	242°07.5	15.7	-8°21.0	11.0	54.2
10	329°10.7	-23°01.6	256°42.2	15.7	-8°10.0	11.0	54.2
11	344°10.4	-23°01.4	271°16.9	15.7	-7°59.0	11.0	54.2
12	359°10.2	-23°01.2	285°51.7	15.8	-7°48.0	11.1	54.2
13	14°09.9	-23°01.0	300°26.5	15.8	-7°36.9	11.1	54.2
14	29°09.6	-23°00.8	315°01.3	15.8	-7°25.8	11.1	54.2
15	44°09.3	-23°00.6	329°36.1	15.9	-7°14.7	11.1	54.2
16	59°09.0	-23°00.4	344°11.0	15.9	-7°03.5	11.2	54.2
17	74°08.7	-23°00.2	358°45.9	15.9	-6°52.3	11.2	54.2
18	89°08.4	-22°60.0	13°20.8	15.9	-6°41.1	11.2	54.2
19	104°08.1	-22°59.7	27°55.7	16.0	-6°29.9	11.2	54.2
20	119°07.8	-22°59.5	42°30.7	16.0	-6°18.7	11.3	54.2
21	134°07.5	-22°59.3	57°05.7	16.0	-6°07.4	11.3	54.2
22	149°07.2	-22°59.1	71°40.7	16.0	-5°56.1	11.3	54.2
23	164°06.9	-22°58.9	86°15.7	16.0	-5°44.8	11.3	54.2
	SD.=16.3	d=0.2			S.D.=14.8		

	Twilight				Twilight	
Lat.	Naut.	Civil	Sunrise	Sunset	Civil	Naut.
72	08:25	10:47	–:–	–:–	13:19	15:41
70	08:06	09:51	–:–	–:–	14:15	16:00
68	07:50	09:18	–:–	–:–	14:48	16:16
66	07:38	08:54	10:30	13:36	15:12	16:28
64	07:27	08:35	09:51	14:15	15:31	16:39
62	07:18	08:19	09:24	14:42	15:47	16:48
60	07:09	08:06	09:03	15:03	15:60	16:56
58	07:02	07:55	08:46	15:20	16:11	17:04
56	06:56	07:45	08:31	15:34	16:21	17:10
54	06:50	07:36	08:19	15:47	16:30	17:16
52	06:44	07:28	08:08	15:58	16:38	17:22
50	06:39	07:20	07:59	16:07	16:46	17:27
45	06:27	07:04	07:38	16:28	17:01	17:38
40	06:17	06:51	07:22	16:44	17:15	17:49
35	06:08	06:40	07:08	16:58	17:26	17:58
30	05:59	06:29	06:55	17:10	17:37	18:06
20	05:43	06:11	06:35	17:31	17:55	18:23
10	05:27	05:54	06:16	17:49	18:12	18:38
0	05:10	05:37	05:59	18:07	18:29	18:55
-10	04:52	05:19	05:42	18:24	18:47	19:14
-20	04:29	04:59	05:23	18:43	19:07	19:36
-30	04:01	04:34	05:01	19:04	19:32	20:05
-35	03:42	04:19	04:48	19:17	19:47	20:23
-40	03:19	04:01	04:34	19:32	20:05	20:46
-45	02:49	03:39	04:16	19:50	20:27	21:16
-50	02:05	03:10	03:54	20:12	20:56	21:60
-52	01:39	02:55	03:43	20:22	21:10	22:26
-54	00:57	02:37	03:31	20:34	21:28	23:07
-56	–:–	02:16	03:17	20:48	21:49	–:–
-58	–:–	01:47	03:01	21:04	22:17	–:–
-60	–:–	01:02	02:41	21:24	23:02	–:–

	Moonrise			Moonset		
Lat.	Mon	Tue	Wed	Mon	Tue	Wed
72	13:37	13:00	12:37	17:59	20:06	21:57
70	12:59	12:40	12:26	18:35	20:25	22:06
68	12:33	12:24	12:17	18:60	20:39	22:13
66	12:13	12:11	12:09	19:19	20:51	22:20
64	11:57	12:00	12:03	19:35	21:01	22:25
62	11:43	11:51	11:57	19:47	21:09	22:29
60	11:31	11:43	11:52	19:58	21:16	22:33
58	11:21	11:36	11:48	20:07	21:22	22:36
56	11:13	11:30	11:44	20:16	21:28	22:39
54	11:05	11:24	11:40	20:23	21:33	22:42
52	10:58	11:19	11:37	20:29	21:37	22:44
50	10:51	11:14	11:34	20:35	21:41	22:46
45	10:38	11:04	11:28	20:48	21:50	22:51
40	10:26	10:56	11:23	20:58	21:57	22:55
35	10:17	10:49	11:18	21:07	22:03	22:58
30	10:08	10:43	11:14	21:15	22:08	23:01
20	09:53	10:32	11:07	21:28	22:18	23:06
10	09:40	10:22	11:01	21:39	22:26	23:11
0	09:28	10:13	10:55	21:50	22:33	23:15
-10	09:16	10:04	10:49	22:01	22:41	23:19
-20	09:03	09:54	10:43	22:12	22:49	23:24
-30	08:48	09:43	10:36	22:25	22:58	23:28
-35	08:39	09:36	10:32	22:32	23:03	23:31
-40	08:29	09:29	10:27	22:41	23:09	23:34
-45	08:18	09:20	10:22	22:50	23:15	23:38
-50	08:03	09:10	10:15	23:02	23:24	23:42
-52	07:57	09:05	10:12	23:08	23:27	23:44
-54	07:49	08:59	10:09	23:14	23:31	23:47
-56	07:41	08:53	10:05	23:20	23:36	23:49
-58	07:31	08:47	10:01	23:28	23:41	23:52
-60	07:21	08:39	09:56	23:36	23:46	23:55

	Sun			Moon		
Day	Eqn.of Time		Mer.	Mer.Pass.		Age
	00^h	12^h	Pass	Upper	Lower	
30	02:07	02:22	12:02	15:39	03:16	4(18%)
31	02:36	02:51	12:02	16:23	04:01	5(26%)
1	03:05	03:19	12:03	17:05	04:44	6(34%)

Increments and Corrections

m 0	Sun Plan.	Aries	Moon	v and d corr		
0	0°00.0	0°00.0	0°00.0	0.0 - 0.0	6.0 - 0.1	12.0 - 0.1
1	0°00.2	0°00.3	0°00.2	0.1 - 0.0	6.1 - 0.1	12.1 - 0.1
2	0°00.5	0°00.5	0°00.5	0.2 - 0.0	6.2 - 0.1	12.2 - 0.1
3	0°00.8	0°00.8	0°00.7	0.3 - 0.0	6.3 - 0.1	12.3 - 0.1
4	0°01.0	0°01.0	0°01.0	0.4 - 0.0	6.4 - 0.1	12.4 - 0.1
5	0°01.2	0°01.3	0°01.2	0.5 - 0.0	6.5 - 0.1	12.5 - 0.1
6	0°01.5	0°01.5	0°01.4	0.6 - 0.0	6.6 - 0.1	12.6 - 0.1
7	0°01.8	0°01.8	0°01.7	0.7 - 0.0	6.7 - 0.1	12.7 - 0.1
8	0°02.0	0°02.0	0°01.9	0.8 - 0.0	6.8 - 0.1	12.8 - 0.1
9	0°02.2	0°02.3	0°02.1	0.9 - 0.0	6.9 - 0.1	12.9 - 0.1
10	0°02.5	0°02.5	0°02.4	1.0 - 0.0	7.0 - 0.1	13.0 - 0.1
11	0°02.8	0°02.8	0°02.6	1.1 - 0.0	7.1 - 0.1	13.1 - 0.1
12	0°03.0	0°03.0	0°02.9	1.2 - 0.0	7.2 - 0.1	13.2 - 0.1
13	0°03.2	0°03.3	0°03.1	1.3 - 0.0	7.3 - 0.1	13.3 - 0.1
14	0°03.5	0°03.5	0°03.3	1.4 - 0.0	7.4 - 0.1	13.4 - 0.1
15	0°03.8	0°03.8	0°03.6	1.5 - 0.0	7.5 - 0.1	13.5 - 0.1
16	0°04.0	0°04.0	0°03.8	1.6 - 0.0	7.6 - 0.1	13.6 - 0.1
17	0°04.2	0°04.3	0°04.1	1.7 - 0.0	7.7 - 0.1	13.7 - 0.1
18	0°04.5	0°04.5	0°04.3	1.8 - 0.0	7.8 - 0.1	13.8 - 0.1
19	0°04.8	0°04.8	0°04.5	1.9 - 0.0	7.9 - 0.1	13.9 - 0.1
20	0°05.0	0°05.0	0°04.8	2.0 - 0.0	8.0 - 0.1	14.0 - 0.1
21	0°05.2	0°05.3	0°05.0	2.1 - 0.0	8.1 - 0.1	14.1 - 0.1
22	0°05.5	0°05.5	0°05.2	2.2 - 0.0	8.2 - 0.1	14.2 - 0.1
23	0°05.8	0°05.8	0°05.5	2.3 - 0.0	8.3 - 0.1	14.3 - 0.1
24	0°06.0	0°06.0	0°05.7	2.4 - 0.0	8.4 - 0.1	14.4 - 0.1
25	0°06.2	0°06.3	0°06.0	2.5 - 0.0	8.5 - 0.1	14.5 - 0.1
26	0°06.5	0°06.5	0°06.2	2.6 - 0.0	8.6 - 0.1	14.6 - 0.1
27	0°06.8	0°06.8	0°06.4	2.7 - 0.0	8.7 - 0.1	14.7 - 0.1
28	0°07.0	0°07.0	0°06.7	2.8 - 0.0	8.8 - 0.1	14.8 - 0.1
29	0°07.2	0°07.3	0°06.9	2.9 - 0.0	8.9 - 0.1	14.9 - 0.1
30	0°07.5	0°07.5	0°07.2	3.0 - 0.0	9.0 - 0.1	15.0 - 0.1
31	0°07.8	0°07.8	0°07.4	3.1 - 0.0	9.1 - 0.1	15.1 - 0.1
32	0°08.0	0°08.0	0°07.6	3.2 - 0.0	9.2 - 0.1	15.2 - 0.1
33	0°08.2	0°08.3	0°07.9	3.3 - 0.0	9.3 - 0.1	15.3 - 0.1
34	0°08.5	0°08.5	0°08.1	3.4 - 0.0	9.4 - 0.1	15.4 - 0.1
35	0°08.8	0°08.8	0°08.4	3.5 - 0.0	9.5 - 0.1	15.5 - 0.1
36	0°09.0	0°09.0	0°08.6	3.6 - 0.0	9.6 - 0.1	15.6 - 0.1
37	0°09.2	0°09.3	0°08.8	3.7 - 0.0	9.7 - 0.1	15.7 - 0.1
38	0°09.5	0°09.5	0°09.1	3.8 - 0.0	9.8 - 0.1	15.8 - 0.1
39	0°09.8	0°09.8	0°09.3	3.9 - 0.0	9.9 - 0.1	15.9 - 0.1
40	0°10.0	0°10.0	0°09.5	4.0 - 0.0	10.0 - 0.1	16.0 - 0.1
41	0°10.2	0°10.3	0°09.8	4.1 - 0.0	10.1 - 0.1	16.1 - 0.1
42	0°10.5	0°10.5	0°10.0	4.2 - 0.0	10.2 - 0.1	16.2 - 0.1
43	0°10.8	0°10.8	0°10.3	4.3 - 0.0	10.3 - 0.1	16.3 - 0.1
44	0°11.0	0°11.0	0°10.5	4.4 - 0.0	10.4 - 0.1	16.4 - 0.1
45	0°11.2	0°11.3	0°10.7	4.5 - 0.0	10.5 - 0.1	16.5 - 0.1
46	0°11.5	0°11.5	0°11.0	4.6 - 0.0	10.6 - 0.1	16.6 - 0.1
47	0°11.8	0°11.8	0°11.2	4.7 - 0.0	10.7 - 0.1	16.7 - 0.1
48	0°12.0	0°12.0	0°11.5	4.8 - 0.0	10.8 - 0.1	16.8 - 0.1
49	0°12.2	0°12.3	0°11.7	4.9 - 0.0	10.9 - 0.1	16.9 - 0.1
50	0°12.5	0°12.5	0°11.9	5.0 - 0.0	11.0 - 0.1	17.0 - 0.1
51	0°12.8	0°12.8	0°12.2	5.1 - 0.0	11.1 - 0.1	17.1 - 0.1
52	0°13.0	0°13.0	0°12.4	5.2 - 0.0	11.2 - 0.1	17.2 - 0.1
53	0°13.2	0°13.3	0°12.6	5.3 - 0.0	11.3 - 0.1	17.3 - 0.1
54	0°13.5	0°13.5	0°12.9	5.4 - 0.0	11.4 - 0.1	17.4 - 0.1
55	0°13.8	0°13.8	0°13.1	5.5 - 0.0	11.5 - 0.1	17.5 - 0.1
56	0°14.0	0°14.0	0°13.4	5.6 - 0.0	11.6 - 0.1	17.6 - 0.1
57	0°14.2	0°14.3	0°13.6	5.7 - 0.0	11.7 - 0.1	17.7 - 0.1
58	0°14.5	0°14.5	0°13.8	5.8 - 0.0	11.8 - 0.1	17.8 - 0.1
59	0°14.7	0°14.8	0°14.1	5.9 - 0.0	11.9 - 0.1	17.9 - 0.1

m 1	Sun Plan.	Aries	Moon	v and d corr		
0	0°15.0	0°15.0	0°14.3	0.0 - 0.0	6.0 - 0.2	12.0 - 0.3
1	0°15.2	0°15.3	0°14.6	0.1 - 0.0	6.1 - 0.2	12.1 - 0.3
2	0°15.5	0°15.5	0°14.8	0.2 - 0.0	6.2 - 0.2	12.2 - 0.3
3	0°15.8	0°15.8	0°15.0	0.3 - 0.0	6.3 - 0.2	12.3 - 0.3
4	0°16.0	0°16.0	0°15.3	0.4 - 0.0	6.4 - 0.2	12.4 - 0.3
5	0°16.2	0°16.3	0°15.5	0.5 - 0.0	6.5 - 0.2	12.5 - 0.3
6	0°16.5	0°16.5	0°15.7	0.6 - 0.0	6.6 - 0.2	12.6 - 0.3
7	0°16.8	0°16.8	0°16.0	0.7 - 0.0	6.7 - 0.2	12.7 - 0.3
8	0°17.0	0°17.0	0°16.2	0.8 - 0.0	6.8 - 0.2	12.8 - 0.3
9	0°17.2	0°17.3	0°16.5	0.9 - 0.0	6.9 - 0.2	12.9 - 0.3
10	0°17.5	0°17.5	0°16.7	1.0 - 0.0	7.0 - 0.2	13.0 - 0.3
11	0°17.8	0°17.8	0°16.9	1.1 - 0.0	7.1 - 0.2	13.1 - 0.3
12	0°18.0	0°18.0	0°17.2	1.2 - 0.0	7.2 - 0.2	13.2 - 0.3
13	0°18.2	0°18.3	0°17.4	1.3 - 0.0	7.3 - 0.2	13.3 - 0.3
14	0°18.5	0°18.6	0°17.7	1.4 - 0.0	7.4 - 0.2	13.4 - 0.3
15	0°18.8	0°18.8	0°17.9	1.5 - 0.0	7.5 - 0.2	13.5 - 0.3
16	0°19.0	0°19.1	0°18.1	1.6 - 0.0	7.6 - 0.2	13.6 - 0.3
17	0°19.2	0°19.3	0°18.4	1.7 - 0.0	7.7 - 0.2	13.7 - 0.3
18	0°19.5	0°19.6	0°18.6	1.8 - 0.0	7.8 - 0.2	13.8 - 0.3
19	0°19.8	0°19.8	0°18.9	1.9 - 0.0	7.9 - 0.2	13.9 - 0.3
20	0°20.0	0°20.1	0°19.1	2.0 - 0.1	8.0 - 0.2	14.0 - 0.4
21	0°20.2	0°20.3	0°19.3	2.1 - 0.1	8.1 - 0.2	14.1 - 0.4
22	0°20.5	0°20.6	0°19.6	2.2 - 0.1	8.2 - 0.2	14.2 - 0.4
23	0°20.8	0°20.8	0°19.8	2.3 - 0.1	8.3 - 0.2	14.3 - 0.4
24	0°21.0	0°21.1	0°20.0	2.4 - 0.1	8.4 - 0.2	14.4 - 0.4
25	0°21.2	0°21.3	0°20.3	2.5 - 0.1	8.5 - 0.2	14.5 - 0.4
26	0°21.5	0°21.6	0°20.5	2.6 - 0.1	8.6 - 0.2	14.6 - 0.4
27	0°21.8	0°21.8	0°20.8	2.7 - 0.1	8.7 - 0.2	14.7 - 0.4
28	0°22.0	0°22.1	0°21.0	2.8 - 0.1	8.8 - 0.2	14.8 - 0.4
29	0°22.2	0°22.3	0°21.2	2.9 - 0.1	8.9 - 0.2	14.9 - 0.4
30	0°22.5	0°22.6	0°21.5	3.0 - 0.1	9.0 - 0.2	15.0 - 0.4
31	0°22.8	0°22.8	0°21.7	3.1 - 0.1	9.1 - 0.2	15.1 - 0.4
32	0°23.0	0°23.1	0°22.0	3.2 - 0.1	9.2 - 0.2	15.2 - 0.4
33	0°23.2	0°23.3	0°22.2	3.3 - 0.1	9.3 - 0.2	15.3 - 0.4
34	0°23.5	0°23.6	0°22.4	3.4 - 0.1	9.4 - 0.2	15.4 - 0.4
35	0°23.8	0°23.8	0°22.7	3.5 - 0.1	9.5 - 0.2	15.5 - 0.4
36	0°24.0	0°24.1	0°22.9	3.6 - 0.1	9.6 - 0.2	15.6 - 0.4
37	0°24.2	0°24.3	0°23.1	3.7 - 0.1	9.7 - 0.2	15.7 - 0.4
38	0°24.5	0°24.6	0°23.4	3.8 - 0.1	9.8 - 0.2	15.8 - 0.4
39	0°24.8	0°24.8	0°23.6	3.9 - 0.1	9.9 - 0.2	15.9 - 0.4
40	0°25.0	0°25.1	0°23.9	4.0 - 0.1	10.0 - 0.3	16.0 - 0.4
41	0°25.2	0°25.3	0°24.1	4.1 - 0.1	10.1 - 0.3	16.1 - 0.4
42	0°25.5	0°25.6	0°24.3	4.2 - 0.1	10.2 - 0.3	16.2 - 0.4
43	0°25.8	0°25.8	0°24.6	4.3 - 0.1	10.3 - 0.3	16.3 - 0.4
44	0°26.0	0°26.1	0°24.8	4.4 - 0.1	10.4 - 0.3	16.4 - 0.4
45	0°26.2	0°26.3	0°25.1	4.5 - 0.1	10.5 - 0.3	16.5 - 0.4
46	0°26.5	0°26.6	0°25.3	4.6 - 0.1	10.6 - 0.3	16.6 - 0.4
47	0°26.8	0°26.8	0°25.5	4.7 - 0.1	10.7 - 0.3	16.7 - 0.4
48	0°27.0	0°27.1	0°25.8	4.8 - 0.1	10.8 - 0.3	16.8 - 0.4
49	0°27.2	0°27.3	0°26.0	4.9 - 0.1	10.9 - 0.3	16.9 - 0.4
50	0°27.5	0°27.6	0°26.2	5.0 - 0.1	11.0 - 0.3	17.0 - 0.4
51	0°27.8	0°27.8	0°26.5	5.1 - 0.1	11.1 - 0.3	17.1 - 0.4
52	0°28.0	0°28.1	0°26.7	5.2 - 0.1	11.2 - 0.3	17.2 - 0.4
53	0°28.2	0°28.3	0°27.0	5.3 - 0.1	11.3 - 0.3	17.3 - 0.4
54	0°28.5	0°28.6	0°27.2	5.4 - 0.1	11.4 - 0.3	17.4 - 0.4
55	0°28.7	0°28.8	0°27.4	5.5 - 0.1	11.5 - 0.3	17.5 - 0.4
56	0°29.0	0°29.1	0°27.7	5.6 - 0.1	11.6 - 0.3	17.6 - 0.4
57	0°29.3	0°29.3	0°27.9	5.7 - 0.1	11.7 - 0.3	17.7 - 0.4
58	0°29.5	0°29.6	0°28.2	5.8 - 0.1	11.8 - 0.3	17.8 - 0.4
59	0°29.7	0°29.8	0°28.4	5.9 - 0.1	11.9 - 0.3	17.9 - 0.4

m 2	Sun Plan.	Aries	Moon	v and d corr		
0	0°30.0	0°30.1	0°28.6	0.0 - 0.0	6.0 - 0.3	12.0 - 0.5
1	0°30.2	0°30.3	0°28.9	0.1 - 0.0	6.1 - 0.3	12.1 - 0.5
2	0°30.5	0°30.6	0°29.1	0.2 - 0.0	6.2 - 0.3	12.2 - 0.5
3	0°30.7	0°30.8	0°29.3	0.3 - 0.0	6.3 - 0.3	12.3 - 0.5
4	0°31.0	0°31.1	0°29.6	0.4 - 0.0	6.4 - 0.3	12.4 - 0.5
5	0°31.3	0°31.3	0°29.8	0.5 - 0.0	6.5 - 0.3	12.5 - 0.5
6	0°31.5	0°31.6	0°30.1	0.6 - 0.0	6.6 - 0.3	12.6 - 0.5
7	0°31.8	0°31.8	0°30.3	0.7 - 0.0	6.7 - 0.3	12.7 - 0.5
8	0°32.0	0°32.1	0°30.5	0.8 - 0.0	6.8 - 0.3	12.8 - 0.5
9	0°32.2	0°32.3	0°30.8	0.9 - 0.0	6.9 - 0.3	12.9 - 0.5
10	0°32.5	0°32.6	0°31.0	1.0 - 0.0	7.0 - 0.3	13.0 - 0.5
11	0°32.8	0°32.8	0°31.3	1.1 - 0.0	7.1 - 0.3	13.1 - 0.5
12	0°33.0	0°33.1	0°31.5	1.2 - 0.1	7.2 - 0.3	13.2 - 0.5
13	0°33.2	0°33.3	0°31.7	1.3 - 0.1	7.3 - 0.3	13.3 - 0.6
14	0°33.5	0°33.6	0°32.0	1.4 - 0.1	7.4 - 0.3	13.4 - 0.6
15	0°33.8	0°33.8	0°32.2	1.5 - 0.1	7.5 - 0.3	13.5 - 0.6
16	0°34.0	0°34.1	0°32.5	1.6 - 0.1	7.6 - 0.3	13.6 - 0.6
17	0°34.2	0°34.3	0°32.7	1.7 - 0.1	7.7 - 0.3	13.7 - 0.6
18	0°34.5	0°34.6	0°32.9	1.8 - 0.1	7.8 - 0.3	13.8 - 0.6
19	0°34.8	0°34.8	0°33.2	1.9 - 0.1	7.9 - 0.3	13.9 - 0.6
20	0°35.0	0°35.1	0°33.4	2.0 - 0.1	8.0 - 0.3	14.0 - 0.6
21	0°35.2	0°35.3	0°33.6	2.1 - 0.1	8.1 - 0.3	14.1 - 0.6
22	0°35.5	0°35.6	0°33.9	2.2 - 0.1	8.2 - 0.3	14.2 - 0.6
23	0°35.8	0°35.8	0°34.1	2.3 - 0.1	8.3 - 0.3	14.3 - 0.6
24	0°36.0	0°36.1	0°34.4	2.4 - 0.1	8.4 - 0.4	14.4 - 0.6
25	0°36.2	0°36.3	0°34.6	2.5 - 0.1	8.5 - 0.4	14.5 - 0.6
26	0°36.5	0°36.6	0°34.8	2.6 - 0.1	8.6 - 0.4	14.6 - 0.6
27	0°36.8	0°36.9	0°35.1	2.7 - 0.1	8.7 - 0.4	14.7 - 0.6
28	0°37.0	0°37.1	0°35.3	2.8 - 0.1	8.8 - 0.4	14.8 - 0.6
29	0°37.2	0°37.4	0°35.6	2.9 - 0.1	8.9 - 0.4	14.9 - 0.6
30	0°37.5	0°37.6	0°35.8	3.0 - 0.1	9.0 - 0.4	15.0 - 0.6
31	0°37.8	0°37.9	0°36.0	3.1 - 0.1	9.1 - 0.4	15.1 - 0.6
32	0°38.0	0°38.1	0°36.3	3.2 - 0.1	9.2 - 0.4	15.2 - 0.6
33	0°38.2	0°38.4	0°36.5	3.3 - 0.1	9.3 - 0.4	15.3 - 0.6
34	0°38.5	0°38.6	0°36.7	3.4 - 0.1	9.4 - 0.4	15.4 - 0.6
35	0°38.8	0°38.9	0°37.0	3.5 - 0.1	9.5 - 0.4	15.5 - 0.6
36	0°39.0	0°39.1	0°37.2	3.6 - 0.2	9.6 - 0.4	15.6 - 0.6
37	0°39.2	0°39.4	0°37.5	3.7 - 0.2	9.7 - 0.4	15.7 - 0.7
38	0°39.5	0°39.6	0°37.7	3.8 - 0.2	9.8 - 0.4	15.8 - 0.7
39	0°39.8	0°39.9	0°37.9	3.9 - 0.2	9.9 - 0.4	15.9 - 0.7
40	0°40.0	0°40.1	0°38.2	4.0 - 0.2	10.0 - 0.4	16.0 - 0.7
41	0°40.2	0°40.4	0°38.4	4.1 - 0.2	10.1 - 0.4	16.1 - 0.7
42	0°40.5	0°40.6	0°38.7	4.2 - 0.2	10.2 - 0.4	16.2 - 0.7
43	0°40.8	0°40.9	0°38.9	4.3 - 0.2	10.3 - 0.4	16.3 - 0.7
44	0°41.0	0°41.1	0°39.1	4.4 - 0.2	10.4 - 0.4	16.4 - 0.7
45	0°41.2	0°41.4	0°39.4	4.5 - 0.2	10.5 - 0.4	16.5 - 0.7
46	0°41.5	0°41.6	0°39.6	4.6 - 0.2	10.6 - 0.4	16.6 - 0.7
47	0°41.8	0°41.9	0°39.8	4.7 - 0.2	10.7 - 0.4	16.7 - 0.7
48	0°42.0	0°42.1	0°40.1	4.8 - 0.2	10.8 - 0.5	16.8 - 0.7
49	0°42.2	0°42.4	0°40.3	4.9 - 0.2	10.9 - 0.5	16.9 - 0.7
50	0°42.5	0°42.6	0°40.6	5.0 - 0.2	11.0 - 0.5	17.0 - 0.7
51	0°42.8	0°42.9	0°40.8	5.1 - 0.2	11.1 - 0.5	17.1 - 0.7
52	0°43.0	0°43.1	0°41.0	5.2 - 0.2	11.2 - 0.5	17.2 - 0.7
53	0°43.2	0°43.4	0°41.3	5.3 - 0.2	11.3 - 0.5	17.3 - 0.7
54	0°43.5	0°43.6	0°41.5	5.4 - 0.2	11.4 - 0.5	17.4 - 0.7
55	0°43.8	0°43.9	0°41.8	5.5 - 0.2	11.5 - 0.5	17.5 - 0.7
56	0°44.0	0°44.1	0°42.0	5.6 - 0.2	11.6 - 0.5	17.6 - 0.7
57	0°44.2	0°44.4	0°42.2	5.7 - 0.2	11.7 - 0.5	17.7 - 0.7
58	0°44.5	0°44.6	0°42.5	5.8 - 0.2	11.8 - 0.5	17.8 - 0.7
59	0°44.8	0°44.9	0°42.7	5.9 - 0.2	11.9 - 0.5	17.9 - 0.7

Increments and Corrections

m 3	Sun Plan.	Aries	Moon	v and d corr		
0	0°45.0	0°45.1	0°43.0	0.0 - 0.0	6.0 - 0.4	12.0 - 0.7
1	0°45.2	0°45.4	0°43.2	0.1 - 0.0	6.1 - 0.4	12.1 - 0.7
2	0°45.5	0°45.6	0°43.4	0.2 - 0.0	6.2 - 0.4	12.2 - 0.7
3	0°45.8	0°45.9	0°43.7	0.3 - 0.0	6.3 - 0.4	12.3 - 0.7
4	0°46.0	0°46.1	0°43.9	0.4 - 0.0	6.4 - 0.4	12.4 - 0.7
5	0°46.2	0°46.4	0°44.1	0.5 - 0.0	6.5 - 0.4	12.5 - 0.7
6	0°46.5	0°46.6	0°44.4	0.6 - 0.0	6.6 - 0.4	12.6 - 0.7
7	0°46.8	0°46.9	0°44.6	0.7 - 0.0	6.7 - 0.4	12.7 - 0.7
8	0°47.0	0°47.1	0°44.9	0.8 - 0.0	6.8 - 0.4	12.8 - 0.7
9	0°47.2	0°47.4	0°45.1	0.9 - 0.1	6.9 - 0.4	12.9 - 0.8
10	0°47.5	0°47.6	0°45.3	1.0 - 0.1	7.0 - 0.4	13.0 - 0.8
11	0°47.8	0°47.9	0°45.6	1.1 - 0.1	7.1 - 0.4	13.1 - 0.8
12	0°48.0	0°48.1	0°45.8	1.2 - 0.1	7.2 - 0.4	13.2 - 0.8
13	0°48.2	0°48.4	0°46.1	1.3 - 0.1	7.3 - 0.4	13.3 - 0.8
14	0°48.5	0°48.6	0°46.3	1.4 - 0.1	7.4 - 0.4	13.4 - 0.8
15	0°48.8	0°48.9	0°46.5	1.5 - 0.1	7.5 - 0.4	13.5 - 0.8
16	0°49.0	0°49.1	0°46.8	1.6 - 0.1	7.6 - 0.4	13.6 - 0.8
17	0°49.2	0°49.4	0°47.0	1.7 - 0.1	7.7 - 0.4	13.7 - 0.8
18	0°49.5	0°49.6	0°47.2	1.8 - 0.1	7.8 - 0.5	13.8 - 0.8
19	0°49.8	0°49.9	0°47.5	1.9 - 0.1	7.9 - 0.5	13.9 - 0.8
20	0°50.0	0°50.1	0°47.7	2.0 - 0.1	8.0 - 0.5	14.0 - 0.8
21	0°50.2	0°50.4	0°48.0	2.1 - 0.1	8.1 - 0.5	14.1 - 0.8
22	0°50.5	0°50.6	0°48.2	2.2 - 0.1	8.2 - 0.5	14.2 - 0.8
23	0°50.8	0°50.9	0°48.4	2.3 - 0.1	8.3 - 0.5	14.3 - 0.8
24	0°51.0	0°51.1	0°48.7	2.4 - 0.1	8.4 - 0.5	14.4 - 0.8
25	0°51.2	0°51.4	0°48.9	2.5 - 0.1	8.5 - 0.5	14.5 - 0.8
26	0°51.5	0°51.6	0°49.2	2.6 - 0.2	8.6 - 0.5	14.6 - 0.9
27	0°51.8	0°51.9	0°49.4	2.7 - 0.2	8.7 - 0.5	14.7 - 0.9
28	0°52.0	0°52.1	0°49.6	2.8 - 0.2	8.8 - 0.5	14.8 - 0.9
29	0°52.2	0°52.4	0°49.9	2.9 - 0.2	8.9 - 0.5	14.9 - 0.9
30	0°52.5	0°52.6	0°50.1	3.0 - 0.2	9.0 - 0.5	15.0 - 0.9
31	0°52.8	0°52.9	0°50.3	3.1 - 0.2	9.1 - 0.5	15.1 - 0.9
32	0°53.0	0°53.1	0°50.6	3.2 - 0.2	9.2 - 0.5	15.2 - 0.9
33	0°53.2	0°53.4	0°50.8	3.3 - 0.2	9.3 - 0.5	15.3 - 0.9
34	0°53.5	0°53.6	0°51.1	3.4 - 0.2	9.4 - 0.5	15.4 - 0.9
35	0°53.8	0°53.9	0°51.3	3.5 - 0.2	9.5 - 0.6	15.5 - 0.9
36	0°54.0	0°54.1	0°51.5	3.6 - 0.2	9.6 - 0.6	15.6 - 0.9
37	0°54.2	0°54.4	0°51.8	3.7 - 0.2	9.7 - 0.6	15.7 - 0.9
38	0°54.5	0°54.6	0°52.0	3.8 - 0.2	9.8 - 0.6	15.8 - 0.9
39	0°54.8	0°54.9	0°52.3	3.9 - 0.2	9.9 - 0.6	15.9 - 0.9
40	0°55.0	0°55.2	0°52.5	4.0 - 0.2	10.0 - 0.6	16.0 - 0.9
41	0°55.2	0°55.4	0°52.7	4.1 - 0.2	10.1 - 0.6	16.1 - 0.9
42	0°55.5	0°55.7	0°53.0	4.2 - 0.2	10.2 - 0.6	16.2 - 0.9
43	0°55.8	0°55.9	0°53.2	4.3 - 0.3	10.3 - 0.6	16.3 - 1.0
44	0°56.0	0°56.2	0°53.4	4.4 - 0.3	10.4 - 0.6	16.4 - 1.0
45	0°56.2	0°56.4	0°53.7	4.5 - 0.3	10.5 - 0.6	16.5 - 1.0
46	0°56.5	0°56.7	0°53.9	4.6 - 0.3	10.6 - 0.6	16.6 - 1.0
47	0°56.8	0°56.9	0°54.2	4.7 - 0.3	10.7 - 0.6	16.7 - 1.0
48	0°57.0	0°57.2	0°54.4	4.8 - 0.3	10.8 - 0.6	16.8 - 1.0
49	0°57.2	0°57.4	0°54.6	4.9 - 0.3	10.9 - 0.6	16.9 - 1.0
50	0°57.5	0°57.7	0°54.9	5.0 - 0.3	11.0 - 0.6	17.0 - 1.0
51	0°57.7	0°57.9	0°55.1	5.1 - 0.3	11.1 - 0.6	17.1 - 1.0
52	0°58.0	0°58.2	0°55.4	5.2 - 0.3	11.2 - 0.7	17.2 - 1.0
53	0°58.2	0°58.4	0°55.6	5.3 - 0.3	11.3 - 0.7	17.3 - 1.0
54	0°58.5	0°58.7	0°55.8	5.4 - 0.3	11.4 - 0.7	17.4 - 1.0
55	0°58.8	0°58.9	0°56.1	5.5 - 0.3	11.5 - 0.7	17.5 - 1.0
56	0°59.0	0°59.2	0°56.3	5.6 - 0.3	11.6 - 0.7	17.6 - 1.0
57	0°59.3	0°59.4	0°56.6	5.7 - 0.3	11.7 - 0.7	17.7 - 1.0
58	0°59.5	0°59.7	0°56.8	5.8 - 0.3	11.8 - 0.7	17.8 - 1.0
59	0°59.8	0°59.9	0°57.0	5.9 - 0.3	11.9 - 0.7	17.9 - 1.0

m 4	Sun Plan.	Aries	Moon	v and d corr		
0	1°00.0	1°00.2	0°57.3	0.0 - 0.0	6.0 - 0.5	12.0 - 0.9
1	1°00.2	1°00.4	0°57.5	0.1 - 0.0	6.1 - 0.5	12.1 - 0.9
2	1°00.5	1°00.7	0°57.7	0.2 - 0.0	6.2 - 0.5	12.2 - 0.9
3	1°00.7	1°00.9	0°58.0	0.3 - 0.0	6.3 - 0.5	12.3 - 0.9
4	1°01.0	1°01.2	0°58.2	0.4 - 0.0	6.4 - 0.5	12.4 - 0.9
5	1°01.2	1°01.4	0°58.5	0.5 - 0.0	6.5 - 0.5	12.5 - 0.9
6	1°01.5	1°01.7	0°58.7	0.6 - 0.0	6.6 - 0.5	12.6 - 0.9
7	1°01.7	1°01.9	0°58.9	0.7 - 0.1	6.7 - 0.5	12.7 - 1.0
8	1°02.0	1°02.2	0°59.2	0.8 - 0.1	6.8 - 0.5	12.8 - 1.0
9	1°02.3	1°02.4	0°59.4	0.9 - 0.1	6.9 - 0.5	12.9 - 1.0
10	1°02.5	1°02.7	0°59.7	1.0 - 0.1	7.0 - 0.5	13.0 - 1.0
11	1°02.8	1°02.9	0°59.9	1.1 - 0.1	7.1 - 0.5	13.1 - 1.0
12	1°03.0	1°03.2	1°00.1	1.2 - 0.1	7.2 - 0.5	13.2 - 1.0
13	1°03.3	1°03.4	1°00.4	1.3 - 0.1	7.3 - 0.5	13.3 - 1.0
14	1°03.5	1°03.7	1°00.6	1.4 - 0.1	7.4 - 0.6	13.4 - 1.0
15	1°03.8	1°03.9	1°00.8	1.5 - 0.1	7.5 - 0.6	13.5 - 1.0
16	1°04.0	1°04.2	1°01.1	1.6 - 0.1	7.6 - 0.6	13.6 - 1.0
17	1°04.2	1°04.4	1°01.3	1.7 - 0.1	7.7 - 0.6	13.7 - 1.0
18	1°04.5	1°04.7	1°01.6	1.8 - 0.1	7.8 - 0.6	13.8 - 1.0
19	1°04.7	1°04.9	1°01.8	1.9 - 0.1	7.9 - 0.6	13.9 - 1.0
20	1°05.0	1°05.2	1°02.0	2.0 - 0.2	8.0 - 0.6	14.0 - 1.1
21	1°05.2	1°05.4	1°02.3	2.1 - 0.2	8.1 - 0.6	14.1 - 1.1
22	1°05.5	1°05.7	1°02.5	2.2 - 0.2	8.2 - 0.6	14.2 - 1.1
23	1°05.8	1°05.9	1°02.8	2.3 - 0.2	8.3 - 0.6	14.3 - 1.1
24	1°06.0	1°06.2	1°03.0	2.4 - 0.2	8.4 - 0.6	14.4 - 1.1
25	1°06.3	1°06.4	1°03.2	2.5 - 0.2	8.5 - 0.6	14.5 - 1.1
26	1°06.5	1°06.7	1°03.5	2.6 - 0.2	8.6 - 0.6	14.6 - 1.1
27	1°06.8	1°06.9	1°03.7	2.7 - 0.2	8.7 - 0.7	14.7 - 1.1
28	1°07.0	1°07.2	1°03.9	2.8 - 0.2	8.8 - 0.7	14.8 - 1.1
29	1°07.3	1°07.4	1°04.2	2.9 - 0.2	8.9 - 0.7	14.9 - 1.1
30	1°07.5	1°07.7	1°04.4	3.0 - 0.2	9.0 - 0.7	15.0 - 1.1
31	1°07.7	1°07.9	1°04.7	3.1 - 0.2	9.1 - 0.7	15.1 - 1.1
32	1°08.0	1°08.2	1°04.9	3.2 - 0.2	9.2 - 0.7	15.2 - 1.1
33	1°08.2	1°08.4	1°05.1	3.3 - 0.2	9.3 - 0.7	15.3 - 1.1
34	1°08.5	1°08.7	1°05.4	3.4 - 0.3	9.4 - 0.7	15.4 - 1.2
35	1°08.7	1°08.9	1°05.6	3.5 - 0.3	9.5 - 0.7	15.5 - 1.2
36	1°09.0	1°09.2	1°05.9	3.6 - 0.3	9.6 - 0.7	15.6 - 1.2
37	1°09.3	1°09.4	1°06.1	3.7 - 0.3	9.7 - 0.7	15.7 - 1.2
38	1°09.5	1°09.7	1°06.3	3.8 - 0.3	9.8 - 0.7	15.8 - 1.2
39	1°09.8	1°09.9	1°06.6	3.9 - 0.3	9.9 - 0.7	15.9 - 1.2
40	1°10.0	1°10.2	1°06.8	4.0 - 0.3	10.0 - 0.8	16.0 - 1.2
41	1°10.3	1°10.4	1°07.0	4.1 - 0.3	10.1 - 0.8	16.1 - 1.2
42	1°10.5	1°10.7	1°07.3	4.2 - 0.3	10.2 - 0.8	16.2 - 1.2
43	1°10.8	1°10.9	1°07.5	4.3 - 0.3	10.3 - 0.8	16.3 - 1.2
44	1°11.0	1°11.2	1°07.8	4.4 - 0.3	10.4 - 0.8	16.4 - 1.2
45	1°11.2	1°11.4	1°08.0	4.5 - 0.3	10.5 - 0.8	16.5 - 1.2
46	1°11.5	1°11.7	1°08.2	4.6 - 0.3	10.6 - 0.8	16.6 - 1.2
47	1°11.7	1°11.9	1°08.5	4.7 - 0.4	10.7 - 0.8	16.7 - 1.3
48	1°12.0	1°12.2	1°08.7	4.8 - 0.4	10.8 - 0.8	16.8 - 1.3
49	1°12.2	1°12.4	1°09.0	4.9 - 0.4	10.9 - 0.8	16.9 - 1.3
50	1°12.5	1°12.7	1°09.2	5.0 - 0.4	11.0 - 0.8	17.0 - 1.3
51	1°12.7	1°12.9	1°09.4	5.1 - 0.4	11.1 - 0.8	17.1 - 1.3
52	1°13.0	1°13.2	1°09.7	5.2 - 0.4	11.2 - 0.8	17.2 - 1.3
53	1°13.2	1°13.5	1°09.9	5.3 - 0.4	11.3 - 0.8	17.3 - 1.3
54	1°13.5	1°13.7	1°10.2	5.4 - 0.4	11.4 - 0.9	17.4 - 1.3
55	1°13.8	1°14.0	1°10.4	5.5 - 0.4	11.5 - 0.9	17.5 - 1.3
56	1°14.0	1°14.2	1°10.6	5.6 - 0.4	11.6 - 0.9	17.6 - 1.3
57	1°14.3	1°14.5	1°10.9	5.7 - 0.4	11.7 - 0.9	17.7 - 1.3
58	1°14.5	1°14.7	1°11.1	5.8 - 0.4	11.8 - 0.9	17.8 - 1.3
59	1°14.8	1°15.0	1°11.3	5.9 - 0.4	11.9 - 0.9	17.9 - 1.3

m 5	Sun Plan.	Aries	Moon	v and d corr		
0	1°15.0	1°15.2	1°11.6	0.0 - 0.0	6.0 - 0.5	12.0 - 1.1
1	1°15.2	1°15.5	1°11.8	0.1 - 0.0	6.1 - 0.6	12.1 - 1.1
2	1°15.5	1°15.7	1°12.1	0.2 - 0.0	6.2 - 0.6	12.2 - 1.1
3	1°15.7	1°16.0	1°12.3	0.3 - 0.0	6.3 - 0.6	12.3 - 1.1
4	1°16.0	1°16.2	1°12.5	0.4 - 0.0	6.4 - 0.6	12.4 - 1.1
5	1°16.2	1°16.5	1°12.8	0.5 - 0.0	6.5 - 0.6	12.5 - 1.1
6	1°16.5	1°16.7	1°13.0	0.6 - 0.1	6.6 - 0.6	12.6 - 1.2
7	1°16.7	1°17.0	1°13.3	0.7 - 0.1	6.7 - 0.6	12.7 - 1.2
8	1°17.0	1°17.2	1°13.5	0.8 - 0.1	6.8 - 0.6	12.8 - 1.2
9	1°17.3	1°17.5	1°13.7	0.9 - 0.1	6.9 - 0.6	12.9 - 1.2
10	1°17.5	1°17.7	1°14.0	1.0 - 0.1	7.0 - 0.6	13.0 - 1.2
11	1°17.8	1°18.0	1°14.2	1.1 - 0.1	7.1 - 0.7	13.1 - 1.2
12	1°18.0	1°18.2	1°14.4	1.2 - 0.1	7.2 - 0.7	13.2 - 1.2
13	1°18.2	1°18.5	1°14.7	1.3 - 0.1	7.3 - 0.7	13.3 - 1.2
14	1°18.5	1°18.7	1°14.9	1.4 - 0.1	7.4 - 0.7	13.4 - 1.2
15	1°18.8	1°19.0	1°15.2	1.5 - 0.1	7.5 - 0.7	13.5 - 1.2
16	1°19.0	1°19.2	1°15.4	1.6 - 0.1	7.6 - 0.7	13.6 - 1.2
17	1°19.2	1°19.5	1°15.6	1.7 - 0.2	7.7 - 0.7	13.7 - 1.3
18	1°19.5	1°19.7	1°15.9	1.8 - 0.2	7.8 - 0.7	13.8 - 1.3
19	1°19.7	1°20.0	1°16.1	1.9 - 0.2	7.9 - 0.7	13.9 - 1.3
20	1°20.0	1°20.2	1°16.4	2.0 - 0.2	8.0 - 0.7	14.0 - 1.3
21	1°20.2	1°20.5	1°16.6	2.1 - 0.2	8.1 - 0.7	14.1 - 1.3
22	1°20.5	1°20.7	1°16.8	2.2 - 0.2	8.2 - 0.8	14.2 - 1.3
23	1°20.8	1°21.0	1°17.1	2.3 - 0.2	8.3 - 0.8	14.3 - 1.3
24	1°21.0	1°21.2	1°17.3	2.4 - 0.2	8.4 - 0.8	14.4 - 1.3
25	1°21.3	1°21.5	1°17.5	2.5 - 0.2	8.5 - 0.8	14.5 - 1.3
26	1°21.5	1°21.7	1°17.8	2.6 - 0.2	8.6 - 0.8	14.6 - 1.3
27	1°21.8	1°22.0	1°18.0	2.7 - 0.2	8.7 - 0.8	14.7 - 1.3
28	1°22.0	1°22.2	1°18.3	2.8 - 0.3	8.8 - 0.8	14.8 - 1.4
29	1°22.2	1°22.5	1°18.5	2.9 - 0.3	8.9 - 0.8	14.9 - 1.4
30	1°22.5	1°22.7	1°18.7	3.0 - 0.3	9.0 - 0.8	15.0 - 1.4
31	1°22.8	1°23.0	1°19.0	3.1 - 0.3	9.1 - 0.8	15.1 - 1.4
32	1°23.0	1°23.2	1°19.2	3.2 - 0.3	9.2 - 0.8	15.2 - 1.4
33	1°23.2	1°23.5	1°19.5	3.3 - 0.3	9.3 - 0.9	15.3 - 1.4
34	1°23.5	1°23.7	1°19.7	3.4 - 0.3	9.4 - 0.9	15.4 - 1.4
35	1°23.7	1°24.0	1°19.9	3.5 - 0.3	9.5 - 0.9	15.5 - 1.4
36	1°24.0	1°24.2	1°20.2	3.6 - 0.3	9.6 - 0.9	15.6 - 1.4
37	1°24.3	1°24.5	1°20.4	3.7 - 0.3	9.7 - 0.9	15.7 - 1.4
38	1°24.5	1°24.7	1°20.7	3.8 - 0.3	9.8 - 0.9	15.8 - 1.4
39	1°24.8	1°25.0	1°20.9	3.9 - 0.4	9.9 - 0.9	15.9 - 1.5
40	1°25.0	1°25.2	1°21.1	4.0 - 0.4	10.0 - 0.9	16.0 - 1.5
41	1°25.3	1°25.5	1°21.4	4.1 - 0.4	10.1 - 0.9	16.1 - 1.5
42	1°25.5	1°25.7	1°21.6	4.2 - 0.4	10.2 - 0.9	16.2 - 1.5
43	1°25.8	1°26.0	1°21.8	4.3 - 0.4	10.3 - 0.9	16.3 - 1.5
44	1°26.0	1°26.2	1°22.1	4.4 - 0.4	10.4 - 1.0	16.4 - 1.5
45	1°26.2	1°26.5	1°22.3	4.5 - 0.4	10.5 - 1.0	16.5 - 1.5
46	1°26.5	1°26.7	1°22.6	4.6 - 0.4	10.6 - 1.0	16.6 - 1.5
47	1°26.8	1°27.0	1°22.8	4.7 - 0.4	10.7 - 1.0	16.7 - 1.5
48	1°27.0	1°27.2	1°23.0	4.8 - 0.4	10.8 - 1.0	16.8 - 1.5
49	1°27.2	1°27.5	1°23.3	4.9 - 0.4	10.9 - 1.0	16.9 - 1.5
50	1°27.5	1°27.7	1°23.5	5.0 - 0.5	11.0 - 1.0	17.0 - 1.6
51	1°27.7	1°28.0	1°23.8	5.1 - 0.5	11.1 - 1.0	17.1 - 1.6
52	1°28.0	1°28.2	1°24.0	5.2 - 0.5	11.2 - 1.0	17.2 - 1.6
53	1°28.2	1°28.5	1°24.2	5.3 - 0.5	11.3 - 1.0	17.3 - 1.6
54	1°28.5	1°28.7	1°24.5	5.4 - 0.5	11.4 - 1.0	17.4 - 1.6
55	1°28.8	1°29.0	1°24.7	5.5 - 0.5	11.5 - 1.1	17.5 - 1.6
56	1°29.0	1°29.2	1°24.9	5.6 - 0.5	11.6 - 1.1	17.6 - 1.6
57	1°29.3	1°29.5	1°25.2	5.7 - 0.5	11.7 - 1.1	17.7 - 1.6
58	1°29.5	1°29.7	1°25.4	5.8 - 0.5	11.8 - 1.1	17.8 - 1.6
59	1°29.8	1°30.0	1°25.7	5.9 - 0.5	11.9 - 1.1	17.9 - 1.6

Increments and Corrections

m 6	Sun Plan.	Aries	Moon	v and d corr		
0	1°30.0	1°30.2	1°25.9	0.0 - 0.0	6.0 - 0.7	12.0 - 1.3
1	1°30.2	1°30.5	1°26.1	0.1 - 0.0	6.1 - 0.7	12.1 - 1.3
2	1°30.5	1°30.7	1°26.4	0.2 - 0.0	6.2 - 0.7	12.2 - 1.3
3	1°30.7	1°31.0	1°26.6	0.3 - 0.0	6.3 - 0.7	12.3 - 1.3
4	1°31.0	1°31.2	1°26.9	0.4 - 0.0	6.4 - 0.7	12.4 - 1.3
5	1°31.2	1°31.5	1°27.1	0.5 - 0.1	6.5 - 0.7	12.5 - 1.4
6	1°31.5	1°31.8	1°27.3	0.6 - 0.1	6.6 - 0.7	12.6 - 1.4
7	1°31.7	1°32.0	1°27.6	0.7 - 0.1	6.7 - 0.7	12.7 - 1.4
8	1°32.0	1°32.3	1°27.8	0.8 - 0.1	6.8 - 0.7	12.8 - 1.4
9	1°32.3	1°32.5	1°28.0	0.9 - 0.1	6.9 - 0.7	12.9 - 1.4
10	1°32.5	1°32.8	1°28.3	1.0 - 0.1	7.0 - 0.8	13.0 - 1.4
11	1°32.8	1°33.0	1°28.5	1.1 - 0.1	7.1 - 0.8	13.1 - 1.4
12	1°33.0	1°33.3	1°28.8	1.2 - 0.1	7.2 - 0.8	13.2 - 1.4
13	1°33.2	1°33.5	1°29.0	1.3 - 0.1	7.3 - 0.8	13.3 - 1.4
14	1°33.5	1°33.8	1°29.2	1.4 - 0.2	7.4 - 0.8	13.4 - 1.5
15	1°33.8	1°34.0	1°29.5	1.5 - 0.2	7.5 - 0.8	13.5 - 1.5
16	1°34.0	1°34.3	1°29.7	1.6 - 0.2	7.6 - 0.8	13.6 - 1.5
17	1°34.2	1°34.5	1°30.0	1.7 - 0.2	7.7 - 0.8	13.7 - 1.5
18	1°34.5	1°34.8	1°30.2	1.8 - 0.2	7.8 - 0.8	13.8 - 1.5
19	1°34.8	1°35.0	1°30.4	1.9 - 0.2	7.9 - 0.9	13.9 - 1.5
20	1°35.0	1°35.3	1°30.7	2.0 - 0.2	8.0 - 0.9	14.0 - 1.5
21	1°35.2	1°35.5	1°30.9	2.1 - 0.2	8.1 - 0.9	14.1 - 1.5
22	1°35.5	1°35.8	1°31.1	2.2 - 0.2	8.2 - 0.9	14.2 - 1.5
23	1°35.8	1°36.0	1°31.4	2.3 - 0.2	8.3 - 0.9	14.3 - 1.5
24	1°36.0	1°36.3	1°31.6	2.4 - 0.3	8.4 - 0.9	14.4 - 1.6
25	1°36.3	1°36.5	1°31.9	2.5 - 0.3	8.5 - 0.9	14.5 - 1.6
26	1°36.5	1°36.8	1°32.1	2.6 - 0.3	8.6 - 0.9	14.6 - 1.6
27	1°36.8	1°37.0	1°32.3	2.7 - 0.3	8.7 - 0.9	14.7 - 1.6
28	1°37.0	1°37.3	1°32.6	2.8 - 0.3	8.8 - 1.0	14.8 - 1.6
29	1°37.2	1°37.5	1°32.8	2.9 - 0.3	8.9 - 1.0	14.9 - 1.6
30	1°37.5	1°37.8	1°33.1	3.0 - 0.3	9.0 - 1.0	15.0 - 1.6
31	1°37.8	1°38.0	1°33.3	3.1 - 0.3	9.1 - 1.0	15.1 - 1.6
32	1°38.0	1°38.3	1°33.5	3.2 - 0.3	9.2 - 1.0	15.2 - 1.6
33	1°38.2	1°38.5	1°33.8	3.3 - 0.4	9.3 - 1.0	15.3 - 1.7
34	1°38.5	1°38.8	1°34.0	3.4 - 0.4	9.4 - 1.0	15.4 - 1.7
35	1°38.7	1°39.0	1°34.3	3.5 - 0.4	9.5 - 1.0	15.5 - 1.7
36	1°39.0	1°39.3	1°34.5	3.6 - 0.4	9.6 - 1.0	15.6 - 1.7
37	1°39.3	1°39.5	1°34.7	3.7 - 0.4	9.7 - 1.1	15.7 - 1.7
38	1°39.5	1°39.8	1°35.0	3.8 - 0.4	9.8 - 1.1	15.8 - 1.7
39	1°39.8	1°40.0	1°35.2	3.9 - 0.4	9.9 - 1.1	15.9 - 1.7
40	1°40.0	1°40.3	1°35.4	4.0 - 0.4	10.0 - 1.1	16.0 - 1.7
41	1°40.2	1°40.5	1°35.7	4.1 - 0.4	10.1 - 1.1	16.1 - 1.7
42	1°40.5	1°40.8	1°35.9	4.2 - 0.5	10.2 - 1.1	16.2 - 1.8
43	1°40.8	1°41.0	1°36.2	4.3 - 0.5	10.3 - 1.1	16.3 - 1.8
44	1°41.0	1°41.3	1°36.4	4.4 - 0.5	10.4 - 1.1	16.4 - 1.8
45	1°41.2	1°41.5	1°36.6	4.5 - 0.5	10.5 - 1.1	16.5 - 1.8
46	1°41.5	1°41.8	1°36.9	4.6 - 0.5	10.6 - 1.1	16.6 - 1.8
47	1°41.8	1°42.0	1°37.1	4.7 - 0.5	10.7 - 1.2	16.7 - 1.8
48	1°42.0	1°42.3	1°37.4	4.8 - 0.5	10.8 - 1.2	16.8 - 1.8
49	1°42.2	1°42.5	1°37.6	4.9 - 0.5	10.9 - 1.2	16.9 - 1.8
50	1°42.5	1°42.8	1°37.8	5.0 - 0.5	11.0 - 1.2	17.0 - 1.8
51	1°42.7	1°43.0	1°38.1	5.1 - 0.6	11.1 - 1.2	17.1 - 1.9
52	1°43.0	1°43.3	1°38.3	5.2 - 0.6	11.2 - 1.2	17.2 - 1.9
53	1°43.2	1°43.5	1°38.5	5.3 - 0.6	11.3 - 1.2	17.3 - 1.9
54	1°43.5	1°43.8	1°38.8	5.4 - 0.6	11.4 - 1.2	17.4 - 1.9
55	1°43.8	1°44.0	1°39.0	5.5 - 0.6	11.5 - 1.2	17.5 - 1.9
56	1°44.0	1°44.3	1°39.3	5.6 - 0.6	11.6 - 1.3	17.6 - 1.9
57	1°44.2	1°44.5	1°39.5	5.7 - 0.6	11.7 - 1.3	17.7 - 1.9
58	1°44.5	1°44.8	1°39.7	5.8 - 0.6	11.8 - 1.3	17.8 - 1.9
59	1°44.8	1°45.0	1°40.0	5.9 - 0.6	11.9 - 1.3	17.9 - 1.9

m 7	Sun Plan.	Aries	Moon	v and d corr		
0	1°45.0	1°45.3	1°40.2	0.0 - 0.0	6.0 - 0.8	12.0 - 1.5
1	1°45.2	1°45.5	1°40.5	0.1 - 0.0	6.1 - 0.8	12.1 - 1.5
2	1°45.5	1°45.8	1°40.7	0.2 - 0.0	6.2 - 0.8	12.2 - 1.5
3	1°45.8	1°46.0	1°40.9	0.3 - 0.0	6.3 - 0.8	12.3 - 1.5
4	1°46.0	1°46.3	1°41.2	0.4 - 0.1	6.4 - 0.8	12.4 - 1.6
5	1°46.2	1°46.5	1°41.4	0.5 - 0.1	6.5 - 0.8	12.5 - 1.6
6	1°46.5	1°46.8	1°41.6	0.6 - 0.1	6.6 - 0.8	12.6 - 1.6
7	1°46.7	1°47.0	1°41.9	0.7 - 0.1	6.7 - 0.8	12.7 - 1.6
8	1°47.0	1°47.3	1°42.1	0.8 - 0.1	6.8 - 0.9	12.8 - 1.6
9	1°47.3	1°47.5	1°42.4	0.9 - 0.1	6.9 - 0.9	12.9 - 1.6
10	1°47.5	1°47.8	1°42.6	1.0 - 0.1	7.0 - 0.9	13.0 - 1.6
11	1°47.8	1°48.0	1°42.8	1.1 - 0.1	7.1 - 0.9	13.1 - 1.6
12	1°48.0	1°48.3	1°43.1	1.2 - 0.2	7.2 - 0.9	13.2 - 1.7
13	1°48.2	1°48.5	1°43.3	1.3 - 0.2	7.3 - 0.9	13.3 - 1.7
14	1°48.5	1°48.8	1°43.6	1.4 - 0.2	7.4 - 0.9	13.4 - 1.7
15	1°48.8	1°49.0	1°43.8	1.5 - 0.2	7.5 - 0.9	13.5 - 1.7
16	1°49.0	1°49.3	1°44.0	1.6 - 0.2	7.6 - 1.0	13.6 - 1.7
17	1°49.2	1°49.5	1°44.3	1.7 - 0.2	7.7 - 1.0	13.7 - 1.7
18	1°49.5	1°49.8	1°44.5	1.8 - 0.2	7.8 - 1.0	13.8 - 1.7
19	1°49.8	1°50.0	1°44.8	1.9 - 0.2	7.9 - 1.0	13.9 - 1.7
20	1°50.0	1°50.3	1°45.0	2.0 - 0.3	8.0 - 1.0	14.0 - 1.8
21	1°50.2	1°50.6	1°45.2	2.1 - 0.3	8.1 - 1.0	14.1 - 1.8
22	1°50.5	1°50.8	1°45.5	2.2 - 0.3	8.2 - 1.0	14.2 - 1.8
23	1°50.8	1°51.1	1°45.7	2.3 - 0.3	8.3 - 1.0	14.3 - 1.8
24	1°51.0	1°51.3	1°45.9	2.4 - 0.3	8.4 - 1.1	14.4 - 1.8
25	1°51.3	1°51.6	1°46.2	2.5 - 0.3	8.5 - 1.1	14.5 - 1.8
26	1°51.5	1°51.8	1°46.4	2.6 - 0.3	8.6 - 1.1	14.6 - 1.8
27	1°51.8	1°52.1	1°46.7	2.7 - 0.3	8.7 - 1.1	14.7 - 1.8
28	1°52.0	1°52.3	1°46.9	2.8 - 0.4	8.8 - 1.1	14.8 - 1.9
29	1°52.2	1°52.6	1°47.1	2.9 - 0.4	8.9 - 1.1	14.9 - 1.9
30	1°52.5	1°52.8	1°47.4	3.0 - 0.4	9.0 - 1.1	15.0 - 1.9
31	1°52.7	1°53.1	1°47.6	3.1 - 0.4	9.1 - 1.1	15.1 - 1.9
32	1°53.0	1°53.3	1°47.9	3.2 - 0.4	9.2 - 1.2	15.2 - 1.9
33	1°53.2	1°53.6	1°48.1	3.3 - 0.4	9.3 - 1.2	15.3 - 1.9
34	1°53.5	1°53.8	1°48.3	3.4 - 0.4	9.4 - 1.2	15.4 - 1.9
35	1°53.7	1°54.1	1°48.6	3.5 - 0.4	9.5 - 1.2	15.5 - 1.9
36	1°54.0	1°54.3	1°48.8	3.6 - 0.5	9.6 - 1.2	15.6 - 2.0
37	1°54.2	1°54.6	1°49.0	3.7 - 0.5	9.7 - 1.2	15.7 - 2.0
38	1°54.5	1°54.8	1°49.3	3.8 - 0.5	9.8 - 1.2	15.8 - 2.0
39	1°54.8	1°55.1	1°49.5	3.9 - 0.5	9.9 - 1.2	15.9 - 2.0
40	1°55.0	1°55.3	1°49.8	4.0 - 0.5	10.0 - 1.3	16.0 - 2.0
41	1°55.2	1°55.6	1°50.0	4.1 - 0.5	10.1 - 1.3	16.1 - 2.0
42	1°55.5	1°55.8	1°50.2	4.2 - 0.5	10.2 - 1.3	16.2 - 2.0
43	1°55.8	1°56.1	1°50.5	4.3 - 0.5	10.3 - 1.3	16.3 - 2.0
44	1°56.0	1°56.3	1°50.7	4.4 - 0.6	10.4 - 1.3	16.4 - 2.1
45	1°56.3	1°56.6	1°51.0	4.5 - 0.6	10.5 - 1.3	16.5 - 2.1
46	1°56.5	1°56.8	1°51.2	4.6 - 0.6	10.6 - 1.3	16.6 - 2.1
47	1°56.7	1°57.1	1°51.4	4.7 - 0.6	10.7 - 1.3	16.7 - 2.1
48	1°57.0	1°57.3	1°51.7	4.8 - 0.6	10.8 - 1.4	16.8 - 2.1
49	1°57.2	1°57.6	1°51.9	4.9 - 0.6	10.9 - 1.4	16.9 - 2.1
50	1°57.5	1°57.8	1°52.1	5.0 - 0.6	11.0 - 1.4	17.0 - 2.1
51	1°57.7	1°58.1	1°52.4	5.1 - 0.6	11.1 - 1.4	17.1 - 2.1
52	1°58.0	1°58.3	1°52.6	5.2 - 0.7	11.2 - 1.4	17.2 - 2.2
53	1°58.2	1°58.6	1°52.9	5.3 - 0.7	11.3 - 1.4	17.3 - 2.2
54	1°58.5	1°58.8	1°53.1	5.4 - 0.7	11.4 - 1.4	17.4 - 2.2
55	1°58.8	1°59.1	1°53.3	5.5 - 0.7	11.5 - 1.4	17.5 - 2.2
56	1°59.0	1°59.3	1°53.6	5.6 - 0.7	11.6 - 1.5	17.6 - 2.2
57	1°59.2	1°59.6	1°53.8	5.7 - 0.7	11.7 - 1.5	17.7 - 2.2
58	1°59.5	1°59.8	1°54.1	5.8 - 0.7	11.8 - 1.5	17.8 - 2.2
59	1°59.8	2°00.1	1°54.3	5.9 - 0.7	11.9 - 1.5	17.9 - 2.2

m 8	Sun Plan.	Aries	Moon	v and d corr		
0	2°00.0	2°00.3	1°54.5	0.0 - 0.0	6.0 - 0.9	12.0 - 1.7
1	2°00.3	2°00.6	1°54.8	0.1 - 0.0	6.1 - 0.9	12.1 - 1.7
2	2°00.5	2°00.8	1°55.0	0.2 - 0.0	6.2 - 0.9	12.2 - 1.7
3	2°00.8	2°01.1	1°55.2	0.3 - 0.0	6.3 - 0.9	12.3 - 1.7
4	2°01.0	2°01.3	1°55.5	0.4 - 0.1	6.4 - 0.9	12.4 - 1.8
5	2°01.3	2°01.6	1°55.7	0.5 - 0.1	6.5 - 0.9	12.5 - 1.8
6	2°01.5	2°01.8	1°56.0	0.6 - 0.1	6.6 - 0.9	12.6 - 1.8
7	2°01.8	2°02.1	1°56.2	0.7 - 0.1	6.7 - 0.9	12.7 - 1.8
8	2°02.0	2°02.3	1°56.4	0.8 - 0.1	6.8 - 1.0	12.8 - 1.8
9	2°02.3	2°02.6	1°56.7	0.9 - 0.1	6.9 - 1.0	12.9 - 1.8
10	2°02.5	2°02.8	1°56.9	1.0 - 0.1	7.0 - 1.0	13.0 - 1.8
11	2°02.8	2°03.1	1°57.2	1.1 - 0.2	7.1 - 1.0	13.1 - 1.9
12	2°03.0	2°03.3	1°57.4	1.2 - 0.2	7.2 - 1.0	13.2 - 1.9
13	2°03.3	2°03.6	1°57.6	1.3 - 0.2	7.3 - 1.0	13.3 - 1.9
14	2°03.5	2°03.8	1°57.9	1.4 - 0.2	7.4 - 1.0	13.4 - 1.9
15	2°03.8	2°04.1	1°58.1	1.5 - 0.2	7.5 - 1.1	13.5 - 1.9
16	2°04.0	2°04.3	1°58.4	1.6 - 0.2	7.6 - 1.1	13.6 - 1.9
17	2°04.2	2°04.6	1°58.6	1.7 - 0.2	7.7 - 1.1	13.7 - 1.9
18	2°04.5	2°04.8	1°58.8	1.8 - 0.3	7.8 - 1.1	13.8 - 2.0
19	2°04.7	2°05.1	1°59.1	1.9 - 0.3	7.9 - 1.1	13.9 - 2.0
20	2°05.0	2°05.3	1°59.3	2.0 - 0.3	8.0 - 1.1	14.0 - 2.0
21	2°05.2	2°05.6	1°59.5	2.1 - 0.3	8.1 - 1.1	14.1 - 2.0
22	2°05.5	2°05.8	1°59.8	2.2 - 0.3	8.2 - 1.2	14.2 - 2.0
23	2°05.7	2°06.1	2°00.0	2.3 - 0.3	8.3 - 1.2	14.3 - 2.0
24	2°06.0	2°06.3	2°00.3	2.4 - 0.3	8.4 - 1.2	14.4 - 2.0
25	2°06.2	2°06.6	2°00.5	2.5 - 0.4	8.5 - 1.2	14.5 - 2.1
26	2°06.5	2°06.8	2°00.7	2.6 - 0.4	8.6 - 1.2	14.6 - 2.1
27	2°06.7	2°07.1	2°01.0	2.7 - 0.4	8.7 - 1.2	14.7 - 2.1
28	2°07.0	2°07.3	2°01.2	2.8 - 0.4	8.8 - 1.2	14.8 - 2.1
29	2°07.2	2°07.6	2°01.5	2.9 - 0.4	8.9 - 1.3	14.9 - 2.1
30	2°07.5	2°07.8	2°01.7	3.0 - 0.4	9.0 - 1.3	15.0 - 2.1
31	2°07.8	2°08.1	2°01.9	3.1 - 0.4	9.1 - 1.3	15.1 - 2.1
32	2°08.0	2°08.3	2°02.2	3.2 - 0.5	9.2 - 1.3	15.2 - 2.2
33	2°08.3	2°08.6	2°02.4	3.3 - 0.5	9.3 - 1.3	15.3 - 2.2
34	2°08.5	2°08.9	2°02.6	3.4 - 0.5	9.4 - 1.3	15.4 - 2.2
35	2°08.8	2°09.1	2°02.9	3.5 - 0.5	9.5 - 1.3	15.5 - 2.2
36	2°09.0	2°09.4	2°03.1	3.6 - 0.5	9.6 - 1.4	15.6 - 2.2
37	2°09.3	2°09.6	2°03.4	3.7 - 0.5	9.7 - 1.4	15.7 - 2.2
38	2°09.5	2°09.9	2°03.6	3.8 - 0.5	9.8 - 1.4	15.8 - 2.2
39	2°09.8	2°10.1	2°03.8	3.9 - 0.6	9.9 - 1.4	15.9 - 2.3
40	2°10.0	2°10.4	2°04.1	4.0 - 0.6	10.0 - 1.4	16.0 - 2.3
41	2°10.3	2°10.6	2°04.3	4.1 - 0.6	10.1 - 1.4	16.1 - 2.3
42	2°10.5	2°10.9	2°04.6	4.2 - 0.6	10.2 - 1.4	16.2 - 2.3
43	2°10.8	2°11.1	2°04.8	4.3 - 0.6	10.3 - 1.5	16.3 - 2.3
44	2°11.0	2°11.4	2°05.0	4.4 - 0.6	10.4 - 1.5	16.4 - 2.3
45	2°11.2	2°11.6	2°05.3	4.5 - 0.6	10.5 - 1.5	16.5 - 2.3
46	2°11.5	2°11.9	2°05.5	4.6 - 0.7	10.6 - 1.5	16.6 - 2.4
47	2°11.7	2°12.1	2°05.7	4.7 - 0.7	10.7 - 1.5	16.7 - 2.4
48	2°12.0	2°12.4	2°06.0	4.8 - 0.7	10.8 - 1.5	16.8 - 2.4
49	2°12.2	2°12.6	2°06.2	4.9 - 0.7	10.9 - 1.5	16.9 - 2.4
50	2°12.5	2°12.9	2°06.5	5.0 - 0.7	11.0 - 1.6	17.0 - 2.4
51	2°12.7	2°13.1	2°06.7	5.1 - 0.7	11.1 - 1.6	17.1 - 2.4
52	2°13.0	2°13.4	2°06.9	5.2 - 0.7	11.2 - 1.6	17.2 - 2.4
53	2°13.2	2°13.6	2°07.2	5.3 - 0.8	11.3 - 1.6	17.3 - 2.5
54	2°13.5	2°13.9	2°07.4	5.4 - 0.8	11.4 - 1.6	17.4 - 2.5
55	2°13.7	2°14.1	2°07.7	5.5 - 0.8	11.5 - 1.6	17.5 - 2.5
56	2°14.0	2°14.4	2°07.9	5.6 - 0.8	11.6 - 1.6	17.6 - 2.5
57	2°14.2	2°14.6	2°08.1	5.7 - 0.8	11.7 - 1.7	17.7 - 2.5
58	2°14.5	2°14.9	2°08.4	5.8 - 0.8	11.8 - 1.7	17.8 - 2.5
59	2°14.7	2°15.1	2°08.6	5.9 - 0.8	11.9 - 1.7	17.9 - 2.5

Increments and Corrections

m 9	Sun Plan.	Aries	Moon	v and d corr		
0	2°15.0	2°15.4	2°08.8	0.0 - 0.0	6.0 - 1.0	12.0 - 1.9
1	2°15.3	2°15.6	2°09.1	0.1 - 0.0	6.1 - 1.0	12.1 - 1.9
2	2°15.5	2°15.9	2°09.3	0.2 - 0.0	6.2 - 1.0	12.2 - 1.9
3	2°15.8	2°16.1	2°09.6	0.3 - 0.0	6.3 - 1.0	12.3 - 1.9
4	2°16.0	2°16.4	2°09.8	0.4 - 0.1	6.4 - 1.0	12.4 - 2.0
5	2°16.3	2°16.6	2°10.0	0.5 - 0.1	6.5 - 1.0	12.5 - 2.0
6	2°16.5	2°16.9	2°10.3	0.6 - 0.1	6.6 - 1.0	12.6 - 2.0
7	2°16.8	2°17.1	2°10.5	0.7 - 0.1	6.7 - 1.1	12.7 - 2.0
8	2°17.0	2°17.4	2°10.8	0.8 - 0.1	6.8 - 1.1	12.8 - 2.0
9	2°17.3	2°17.6	2°11.0	0.9 - 0.1	6.9 - 1.1	12.9 - 2.0
10	2°17.5	2°17.9	2°11.2	1.0 - 0.2	7.0 - 1.1	13.0 - 2.1
11	2°17.8	2°18.1	2°11.5	1.1 - 0.2	7.1 - 1.1	13.1 - 2.1
12	2°18.0	2°18.4	2°11.7	1.2 - 0.2	7.2 - 1.1	13.2 - 2.1
13	2°18.2	2°18.6	2°12.0	1.3 - 0.2	7.3 - 1.2	13.3 - 2.1
14	2°18.5	2°18.9	2°12.2	1.4 - 0.2	7.4 - 1.2	13.4 - 2.1
15	2°18.8	2°19.1	2°12.4	1.5 - 0.2	7.5 - 1.2	13.5 - 2.1
16	2°19.0	2°19.4	2°12.7	1.6 - 0.3	7.6 - 1.2	13.6 - 2.2
17	2°19.2	2°19.6	2°12.9	1.7 - 0.3	7.7 - 1.2	13.7 - 2.2
18	2°19.5	2°19.9	2°13.1	1.8 - 0.3	7.8 - 1.2	13.8 - 2.2
19	2°19.7	2°20.1	2°13.4	1.9 - 0.3	7.9 - 1.3	13.9 - 2.2
20	2°20.0	2°20.4	2°13.6	2.0 - 0.3	8.0 - 1.3	14.0 - 2.2
21	2°20.2	2°20.6	2°13.9	2.1 - 0.3	8.1 - 1.3	14.1 - 2.2
22	2°20.5	2°20.9	2°14.1	2.2 - 0.3	8.2 - 1.3	14.2 - 2.2
23	2°20.7	2°21.1	2°14.3	2.3 - 0.4	8.3 - 1.3	14.3 - 2.3
24	2°21.0	2°21.4	2°14.6	2.4 - 0.4	8.4 - 1.3	14.4 - 2.3
25	2°21.2	2°21.6	2°14.8	2.5 - 0.4	8.5 - 1.3	14.5 - 2.3
26	2°21.5	2°21.9	2°15.1	2.6 - 0.4	8.6 - 1.4	14.6 - 2.3
27	2°21.7	2°22.1	2°15.3	2.7 - 0.4	8.7 - 1.4	14.7 - 2.3
28	2°22.0	2°22.4	2°15.5	2.8 - 0.4	8.8 - 1.4	14.8 - 2.3
29	2°22.2	2°22.6	2°15.8	2.9 - 0.5	8.9 - 1.4	14.9 - 2.4
30	2°22.5	2°22.9	2°16.0	3.0 - 0.5	9.0 - 1.4	15.0 - 2.4
31	2°22.8	2°23.1	2°16.2	3.1 - 0.5	9.1 - 1.4	15.1 - 2.4
32	2°23.0	2°23.4	2°16.5	3.2 - 0.5	9.2 - 1.5	15.2 - 2.4
33	2°23.3	2°23.6	2°16.7	3.3 - 0.5	9.3 - 1.5	15.3 - 2.4
34	2°23.5	2°23.9	2°17.0	3.4 - 0.5	9.4 - 1.5	15.4 - 2.4
35	2°23.8	2°24.1	2°17.2	3.5 - 0.6	9.5 - 1.5	15.5 - 2.5
36	2°24.0	2°24.4	2°17.4	3.6 - 0.6	9.6 - 1.5	15.6 - 2.5
37	2°24.3	2°24.6	2°17.7	3.7 - 0.6	9.7 - 1.5	15.7 - 2.5
38	2°24.5	2°24.9	2°17.9	3.8 - 0.6	9.8 - 1.6	15.8 - 2.5
39	2°24.8	2°25.1	2°18.2	3.9 - 0.6	9.9 - 1.6	15.9 - 2.5
40	2°25.0	2°25.4	2°18.4	4.0 - 0.6	10.0 - 1.6	16.0 - 2.5
41	2°25.3	2°25.6	2°18.6	4.1 - 0.6	10.1 - 1.6	16.1 - 2.5
42	2°25.5	2°25.9	2°18.9	4.2 - 0.7	10.2 - 1.6	16.2 - 2.6
43	2°25.8	2°26.1	2°19.1	4.3 - 0.7	10.3 - 1.6	16.3 - 2.6
44	2°26.0	2°26.4	2°19.3	4.4 - 0.7	10.4 - 1.6	16.4 - 2.6
45	2°26.2	2°26.6	2°19.6	4.5 - 0.7	10.5 - 1.7	16.5 - 2.6
46	2°26.5	2°26.9	2°19.8	4.6 - 0.7	10.6 - 1.7	16.6 - 2.6
47	2°26.8	2°27.2	2°20.1	4.7 - 0.7	10.7 - 1.7	16.7 - 2.6
48	2°27.0	2°27.4	2°20.3	4.8 - 0.8	10.8 - 1.7	16.8 - 2.7
49	2°27.2	2°27.7	2°20.5	4.9 - 0.8	10.9 - 1.7	16.9 - 2.7
50	2°27.5	2°27.9	2°20.8	5.0 - 0.8	11.0 - 1.7	17.0 - 2.7
51	2°27.7	2°28.2	2°21.0	5.1 - 0.8	11.1 - 1.8	17.1 - 2.7
52	2°28.0	2°28.4	2°21.3	5.2 - 0.8	11.2 - 1.8	17.2 - 2.7
53	2°28.2	2°28.7	2°21.5	5.3 - 0.8	11.3 - 1.8	17.3 - 2.7
54	2°28.5	2°28.9	2°21.7	5.4 - 0.9	11.4 - 1.8	17.4 - 2.8
55	2°28.7	2°29.2	2°22.0	5.5 - 0.9	11.5 - 1.8	17.5 - 2.8
56	2°29.0	2°29.4	2°22.2	5.6 - 0.9	11.6 - 1.8	17.6 - 2.8
57	2°29.2	2°29.7	2°22.5	5.7 - 0.9	11.7 - 1.9	17.7 - 2.8
58	2°29.5	2°29.9	2°22.7	5.8 - 0.9	11.8 - 1.9	17.8 - 2.8
59	2°29.7	2°30.2	2°22.9	5.9 - 0.9	11.9 - 1.9	17.9 - 2.8

m 10	Sun Plan.	Aries	Moon	v and d corr		
0	2°30.0	2°30.4	2°23.2	0.0 - 0.0	6.0 - 1.0	12.0 - 2.1
1	2°30.3	2°30.7	2°23.4	0.1 - 0.0	6.1 - 1.1	12.1 - 2.1
2	2°30.5	2°30.9	2°23.6	0.2 - 0.0	6.2 - 1.1	12.2 - 2.1
3	2°30.8	2°31.2	2°23.9	0.3 - 0.1	6.3 - 1.1	12.3 - 2.2
4	2°31.0	2°31.4	2°24.1	0.4 - 0.1	6.4 - 1.1	12.4 - 2.2
5	2°31.3	2°31.7	2°24.4	0.5 - 0.1	6.5 - 1.1	12.5 - 2.2
6	2°31.5	2°31.9	2°24.6	0.6 - 0.1	6.6 - 1.2	12.6 - 2.2
7	2°31.8	2°32.2	2°24.8	0.7 - 0.1	6.7 - 1.2	12.7 - 2.2
8	2°32.0	2°32.4	2°25.1	0.8 - 0.1	6.8 - 1.2	12.8 - 2.2
9	2°32.3	2°32.7	2°25.3	0.9 - 0.2	6.9 - 1.2	12.9 - 2.3
10	2°32.5	2°32.9	2°25.6	1.0 - 0.2	7.0 - 1.2	13.0 - 2.3
11	2°32.8	2°33.2	2°25.8	1.1 - 0.2	7.1 - 1.2	13.1 - 2.3
12	2°33.0	2°33.4	2°26.0	1.2 - 0.2	7.2 - 1.3	13.2 - 2.3
13	2°33.2	2°33.7	2°26.3	1.3 - 0.2	7.3 - 1.3	13.3 - 2.3
14	2°33.5	2°33.9	2°26.5	1.4 - 0.2	7.4 - 1.3	13.4 - 2.3
15	2°33.8	2°34.2	2°26.7	1.5 - 0.3	7.5 - 1.3	13.5 - 2.4
16	2°34.0	2°34.4	2°27.0	1.6 - 0.3	7.6 - 1.3	13.6 - 2.4
17	2°34.2	2°34.7	2°27.2	1.7 - 0.3	7.7 - 1.3	13.7 - 2.4
18	2°34.5	2°34.9	2°27.5	1.8 - 0.3	7.8 - 1.4	13.8 - 2.4
19	2°34.8	2°35.2	2°27.7	1.9 - 0.3	7.9 - 1.4	13.9 - 2.4
20	2°35.0	2°35.4	2°27.9	2.0 - 0.4	8.0 - 1.4	14.0 - 2.4
21	2°35.2	2°35.7	2°28.2	2.1 - 0.4	8.1 - 1.4	14.1 - 2.5
22	2°35.5	2°35.9	2°28.4	2.2 - 0.4	8.2 - 1.4	14.2 - 2.5
23	2°35.7	2°36.2	2°28.7	2.3 - 0.4	8.3 - 1.5	14.3 - 2.5
24	2°36.0	2°36.4	2°28.9	2.4 - 0.4	8.4 - 1.5	14.4 - 2.5
25	2°36.2	2°36.7	2°29.1	2.5 - 0.4	8.5 - 1.5	14.5 - 2.5
26	2°36.5	2°36.9	2°29.4	2.6 - 0.5	8.6 - 1.5	14.6 - 2.6
27	2°36.7	2°37.2	2°29.6	2.7 - 0.5	8.7 - 1.5	14.7 - 2.6
28	2°37.0	2°37.4	2°29.8	2.8 - 0.5	8.8 - 1.5	14.8 - 2.6
29	2°37.2	2°37.7	2°30.1	2.9 - 0.5	8.9 - 1.6	14.9 - 2.6
30	2°37.5	2°37.9	2°30.3	3.0 - 0.5	9.0 - 1.6	15.0 - 2.6
31	2°37.8	2°38.2	2°30.6	3.1 - 0.5	9.1 - 1.6	15.1 - 2.6
32	2°38.0	2°38.4	2°30.8	3.2 - 0.6	9.2 - 1.6	15.2 - 2.7
33	2°38.3	2°38.7	2°31.0	3.3 - 0.6	9.3 - 1.6	15.3 - 2.7
34	2°38.5	2°38.9	2°31.3	3.4 - 0.6	9.4 - 1.6	15.4 - 2.7
35	2°38.8	2°39.2	2°31.5	3.5 - 0.6	9.5 - 1.7	15.5 - 2.7
36	2°39.0	2°39.4	2°31.8	3.6 - 0.6	9.6 - 1.7	15.6 - 2.7
37	2°39.3	2°39.7	2°32.0	3.7 - 0.6	9.7 - 1.7	15.7 - 2.7
38	2°39.5	2°39.9	2°32.2	3.8 - 0.7	9.8 - 1.7	15.8 - 2.8
39	2°39.8	2°40.2	2°32.5	3.9 - 0.7	9.9 - 1.7	15.9 - 2.8
40	2°40.0	2°40.4	2°32.7	4.0 - 0.7	10.0 - 1.8	16.0 - 2.8
41	2°40.2	2°40.7	2°32.9	4.1 - 0.7	10.1 - 1.8	16.1 - 2.8
42	2°40.5	2°40.9	2°33.2	4.2 - 0.7	10.2 - 1.8	16.2 - 2.8
43	2°40.8	2°41.2	2°33.4	4.3 - 0.8	10.3 - 1.8	16.3 - 2.9
44	2°41.0	2°41.4	2°33.7	4.4 - 0.8	10.4 - 1.8	16.4 - 2.9
45	2°41.2	2°41.7	2°33.9	4.5 - 0.8	10.5 - 1.8	16.5 - 2.9
46	2°41.5	2°41.9	2°34.1	4.6 - 0.8	10.6 - 1.9	16.6 - 2.9
47	2°41.8	2°42.2	2°34.4	4.7 - 0.8	10.7 - 1.9	16.7 - 2.9
48	2°42.0	2°42.4	2°34.6	4.8 - 0.8	10.8 - 1.9	16.8 - 2.9
49	2°42.2	2°42.7	2°34.9	4.9 - 0.9	10.9 - 1.9	16.9 - 3.0
50	2°42.5	2°42.9	2°35.1	5.0 - 0.9	11.0 - 1.9	17.0 - 3.0
51	2°42.7	2°43.2	2°35.3	5.1 - 0.9	11.1 - 1.9	17.1 - 3.0
52	2°43.0	2°43.4	2°35.6	5.2 - 0.9	11.2 - 2.0	17.2 - 3.0
53	2°43.2	2°43.7	2°35.8	5.3 - 0.9	11.3 - 2.0	17.3 - 3.0
54	2°43.5	2°43.9	2°36.1	5.4 - 0.9	11.4 - 2.0	17.4 - 3.0
55	2°43.7	2°44.2	2°36.3	5.5 - 1.0	11.5 - 2.0	17.5 - 3.1
56	2°44.0	2°44.4	2°36.5	5.6 - 1.0	11.6 - 2.0	17.6 - 3.1
57	2°44.2	2°44.7	2°36.8	5.7 - 1.0	11.7 - 2.0	17.7 - 3.1
58	2°44.5	2°44.9	2°37.0	5.8 - 1.0	11.8 - 2.1	17.8 - 3.1
59	2°44.7	2°45.2	2°37.2	5.9 - 1.0	11.9 - 2.1	17.9 - 3.1

m 11	Sun Plan.	Aries	Moon	v and d corr		
0	2°45.0	2°45.5	2°37.5	0.0 - 0.0	6.0 - 1.2	12.0 - 2.3
1	2°45.3	2°45.7	2°37.7	0.1 - 0.0	6.1 - 1.2	12.1 - 2.3
2	2°45.5	2°46.0	2°38.0	0.2 - 0.0	6.2 - 1.2	12.2 - 2.3
3	2°45.8	2°46.2	2°38.2	0.3 - 0.1	6.3 - 1.2	12.3 - 2.4
4	2°46.0	2°46.5	2°38.4	0.4 - 0.1	6.4 - 1.2	12.4 - 2.4
5	2°46.3	2°46.7	2°38.7	0.5 - 0.1	6.5 - 1.2	12.5 - 2.4
6	2°46.5	2°47.0	2°38.9	0.6 - 0.1	6.6 - 1.3	12.6 - 2.4
7	2°46.8	2°47.2	2°39.2	0.7 - 0.1	6.7 - 1.3	12.7 - 2.4
8	2°47.0	2°47.5	2°39.4	0.8 - 0.2	6.8 - 1.3	12.8 - 2.5
9	2°47.3	2°47.7	2°39.6	0.9 - 0.2	6.9 - 1.3	12.9 - 2.5
10	2°47.5	2°48.0	2°39.9	1.0 - 0.2	7.0 - 1.3	13.0 - 2.5
11	2°47.8	2°48.2	2°40.1	1.1 - 0.2	7.1 - 1.4	13.1 - 2.5
12	2°48.0	2°48.5	2°40.3	1.2 - 0.2	7.2 - 1.4	13.2 - 2.5
13	2°48.2	2°48.7	2°40.6	1.3 - 0.2	7.3 - 1.4	13.3 - 2.5
14	2°48.5	2°49.0	2°40.8	1.4 - 0.3	7.4 - 1.4	13.4 - 2.6
15	2°48.8	2°49.2	2°41.1	1.5 - 0.3	7.5 - 1.4	13.5 - 2.6
16	2°49.0	2°49.5	2°41.3	1.6 - 0.3	7.6 - 1.5	13.6 - 2.6
17	2°49.2	2°49.7	2°41.5	1.7 - 0.3	7.7 - 1.5	13.7 - 2.6
18	2°49.5	2°50.0	2°41.8	1.8 - 0.3	7.8 - 1.5	13.8 - 2.6
19	2°49.8	2°50.2	2°42.0	1.9 - 0.4	7.9 - 1.5	13.9 - 2.7
20	2°50.0	2°50.5	2°42.3	2.0 - 0.4	8.0 - 1.5	14.0 - 2.7
21	2°50.2	2°50.7	2°42.5	2.1 - 0.4	8.1 - 1.6	14.1 - 2.7
22	2°50.5	2°51.0	2°42.7	2.2 - 0.4	8.2 - 1.6	14.2 - 2.7
23	2°50.7	2°51.2	2°43.0	2.3 - 0.4	8.3 - 1.6	14.3 - 2.7
24	2°51.0	2°51.5	2°43.2	2.4 - 0.5	8.4 - 1.6	14.4 - 2.8
25	2°51.2	2°51.7	2°43.4	2.5 - 0.5	8.5 - 1.6	14.5 - 2.8
26	2°51.5	2°52.0	2°43.7	2.6 - 0.5	8.6 - 1.6	14.6 - 2.8
27	2°51.7	2°52.2	2°43.9	2.7 - 0.5	8.7 - 1.7	14.7 - 2.8
28	2°52.0	2°52.5	2°44.2	2.8 - 0.5	8.8 - 1.7	14.8 - 2.8
29	2°52.2	2°52.7	2°44.4	2.9 - 0.6	8.9 - 1.7	14.9 - 2.9
30	2°52.5	2°53.0	2°44.6	3.0 - 0.6	9.0 - 1.7	15.0 - 2.9
31	2°52.8	2°53.2	2°44.9	3.1 - 0.6	9.1 - 1.7	15.1 - 2.9
32	2°53.0	2°53.5	2°45.1	3.2 - 0.6	9.2 - 1.8	15.2 - 2.9
33	2°53.3	2°53.7	2°45.4	3.3 - 0.6	9.3 - 1.8	15.3 - 2.9
34	2°53.5	2°54.0	2°45.6	3.4 - 0.7	9.4 - 1.8	15.4 - 3.0
35	2°53.8	2°54.2	2°45.8	3.5 - 0.7	9.5 - 1.8	15.5 - 3.0
36	2°54.0	2°54.5	2°46.1	3.6 - 0.7	9.6 - 1.8	15.6 - 3.0
37	2°54.3	2°54.7	2°46.3	3.7 - 0.7	9.7 - 1.9	15.7 - 3.0
38	2°54.5	2°55.0	2°46.6	3.8 - 0.7	9.8 - 1.9	15.8 - 3.0
39	2°54.8	2°55.2	2°46.8	3.9 - 0.7	9.9 - 1.9	15.9 - 3.0
40	2°55.0	2°55.5	2°47.0	4.0 - 0.8	10.0 - 1.9	16.0 - 3.1
41	2°55.2	2°55.7	2°47.3	4.1 - 0.8	10.1 - 1.9	16.1 - 3.1
42	2°55.5	2°56.0	2°47.5	4.2 - 0.8	10.2 - 2.0	16.2 - 3.1
43	2°55.8	2°56.2	2°47.7	4.3 - 0.8	10.3 - 2.0	16.3 - 3.1
44	2°56.0	2°56.5	2°48.0	4.4 - 0.8	10.4 - 2.0	16.4 - 3.1
45	2°56.2	2°56.7	2°48.2	4.5 - 0.9	10.5 - 2.0	16.5 - 3.2
46	2°56.5	2°57.0	2°48.5	4.6 - 0.9	10.6 - 2.0	16.6 - 3.2
47	2°56.8	2°57.2	2°48.7	4.7 - 0.9	10.7 - 2.1	16.7 - 3.2
48	2°57.0	2°57.5	2°48.9	4.8 - 0.9	10.8 - 2.1	16.8 - 3.2
49	2°57.2	2°57.7	2°49.2	4.9 - 0.9	10.9 - 2.1	16.9 - 3.2
50	2°57.5	2°58.0	2°49.4	5.0 - 1.0	11.0 - 2.1	17.0 - 3.3
51	2°57.7	2°58.2	2°49.7	5.1 - 1.0	11.1 - 2.1	17.1 - 3.3
52	2°58.0	2°58.5	2°49.9	5.2 - 1.0	11.2 - 2.1	17.2 - 3.3
53	2°58.2	2°58.7	2°50.1	5.3 - 1.0	11.3 - 2.2	17.3 - 3.3
54	2°58.5	2°59.0	2°50.4	5.4 - 1.0	11.4 - 2.2	17.4 - 3.3
55	2°58.7	2°59.2	2°50.6	5.5 - 1.1	11.5 - 2.2	17.5 - 3.4
56	2°59.0	2°59.5	2°50.8	5.6 - 1.1	11.6 - 2.2	17.6 - 3.4
57	2°59.2	2°59.7	2°51.1	5.7 - 1.1	11.7 - 2.2	17.7 - 3.4
58	2°59.5	2°60.0	2°51.3	5.8 - 1.1	11.8 - 2.3	17.8 - 3.4
59	2°59.7	3°00.2	2°51.6	5.9 - 1.1	11.9 - 2.3	17.9 - 3.4

Increments and Corrections

m 12	Sun Plan.	Aries	Moon	v and d corr		
0	3°00.0	3°00.5	2°51.8	0.0 - 0.0	6.0 - 1.3	12.0 - 2.5
1	3°00.3	3°00.7	2°52.0	0.1 - 0.0	6.1 - 1.3	12.1 - 2.5
2	3°00.5	3°01.0	2°52.3	0.2 - 0.0	6.2 - 1.3	12.2 - 2.5
3	3°00.8	3°01.2	2°52.5	0.3 - 0.1	6.3 - 1.3	12.3 - 2.6
4	3°01.0	3°01.5	2°52.8	0.4 - 0.1	6.4 - 1.3	12.4 - 2.6
5	3°01.3	3°01.7	2°53.0	0.5 - 0.1	6.5 - 1.4	12.5 - 2.6
6	3°01.5	3°02.0	2°53.2	0.6 - 0.1	6.6 - 1.4	12.6 - 2.6
7	3°01.8	3°02.2	2°53.5	0.7 - 0.1	6.7 - 1.4	12.7 - 2.6
8	3°02.0	3°02.5	2°53.7	0.8 - 0.2	6.8 - 1.4	12.8 - 2.7
9	3°02.3	3°02.7	2°53.9	0.9 - 0.2	6.9 - 1.4	12.9 - 2.7
10	3°02.5	3°03.0	2°54.2	1.0 - 0.2	7.0 - 1.5	13.0 - 2.7
11	3°02.8	3°03.2	2°54.4	1.1 - 0.2	7.1 - 1.5	13.1 - 2.7
12	3°03.0	3°03.5	2°54.7	1.2 - 0.3	7.2 - 1.5	13.2 - 2.8
13	3°03.3	3°03.8	2°54.9	1.3 - 0.3	7.3 - 1.5	13.3 - 2.8
14	3°03.5	3°04.0	2°55.1	1.4 - 0.3	7.4 - 1.5	13.4 - 2.8
15	3°03.8	3°04.3	2°55.4	1.5 - 0.3	7.5 - 1.6	13.5 - 2.8
16	3°04.0	3°04.5	2°55.6	1.6 - 0.3	7.6 - 1.6	13.6 - 2.8
17	3°04.2	3°04.8	2°55.9	1.7 - 0.4	7.7 - 1.6	13.7 - 2.9
18	3°04.5	3°05.0	2°56.1	1.8 - 0.4	7.8 - 1.6	13.8 - 2.9
19	3°04.7	3°05.3	2°56.3	1.9 - 0.4	7.9 - 1.6	13.9 - 2.9
20	3°05.0	3°05.5	2°56.6	2.0 - 0.4	8.0 - 1.7	14.0 - 2.9
21	3°05.2	3°05.8	2°56.8	2.1 - 0.4	8.1 - 1.7	14.1 - 2.9
22	3°05.5	3°06.0	2°57.0	2.2 - 0.5	8.2 - 1.7	14.2 - 3.0
23	3°05.7	3°06.3	2°57.3	2.3 - 0.5	8.3 - 1.7	14.3 - 3.0
24	3°06.0	3°06.5	2°57.5	2.4 - 0.5	8.4 - 1.8	14.4 - 3.0
25	3°06.2	3°06.8	2°57.8	2.5 - 0.5	8.5 - 1.8	14.5 - 3.0
26	3°06.5	3°07.0	2°58.0	2.6 - 0.5	8.6 - 1.8	14.6 - 3.0
27	3°06.7	3°07.3	2°58.2	2.7 - 0.6	8.7 - 1.8	14.7 - 3.1
28	3°07.0	3°07.5	2°58.5	2.8 - 0.6	8.8 - 1.8	14.8 - 3.1
29	3°07.2	3°07.8	2°58.7	2.9 - 0.6	8.9 - 1.9	14.9 - 3.1
30	3°07.5	3°08.0	2°59.0	3.0 - 0.6	9.0 - 1.9	15.0 - 3.1
31	3°07.8	3°08.3	2°59.2	3.1 - 0.6	9.1 - 1.9	15.1 - 3.1
32	3°08.0	3°08.5	2°59.4	3.2 - 0.7	9.2 - 1.9	15.2 - 3.2
33	3°08.3	3°08.8	2°59.7	3.3 - 0.7	9.3 - 1.9	15.3 - 3.2
34	3°08.5	3°09.0	2°59.9	3.4 - 0.7	9.4 - 2.0	15.4 - 3.2
35	3°08.8	3°09.3	3°00.2	3.5 - 0.7	9.5 - 2.0	15.5 - 3.2
36	3°09.0	3°09.5	3°00.4	3.6 - 0.8	9.6 - 2.0	15.6 - 3.3
37	3°09.3	3°09.8	3°00.6	3.7 - 0.8	9.7 - 2.0	15.7 - 3.3
38	3°09.5	3°10.0	3°00.9	3.8 - 0.8	9.8 - 2.0	15.8 - 3.3
39	3°09.8	3°10.3	3°01.1	3.9 - 0.8	9.9 - 2.1	15.9 - 3.3
40	3°10.0	3°10.5	3°01.3	4.0 - 0.8	10.0 - 2.1	16.0 - 3.3
41	3°10.3	3°10.8	3°01.6	4.1 - 0.9	10.1 - 2.1	16.1 - 3.4
42	3°10.5	3°11.0	3°01.8	4.2 - 0.9	10.2 - 2.1	16.2 - 3.4
43	3°10.8	3°11.3	3°02.1	4.3 - 0.9	10.3 - 2.1	16.3 - 3.4
44	3°11.0	3°11.5	3°02.3	4.4 - 0.9	10.4 - 2.2	16.4 - 3.4
45	3°11.2	3°11.8	3°02.5	4.5 - 0.9	10.5 - 2.2	16.5 - 3.4
46	3°11.5	3°12.0	3°02.8	4.6 - 1.0	10.6 - 2.2	16.6 - 3.5
47	3°11.7	3°12.3	3°03.0	4.7 - 1.0	10.7 - 2.2	16.7 - 3.5
48	3°12.0	3°12.5	3°03.3	4.8 - 1.0	10.8 - 2.3	16.8 - 3.5
49	3°12.2	3°12.8	3°03.5	4.9 - 1.0	10.9 - 2.3	16.9 - 3.5
50	3°12.5	3°13.0	3°03.7	5.0 - 1.0	11.0 - 2.3	17.0 - 3.5
51	3°12.7	3°13.3	3°04.0	5.1 - 1.1	11.1 - 2.3	17.1 - 3.6
52	3°13.0	3°13.5	3°04.2	5.2 - 1.1	11.2 - 2.3	17.2 - 3.6
53	3°13.2	3°13.8	3°04.4	5.3 - 1.1	11.3 - 2.4	17.3 - 3.6
54	3°13.5	3°14.0	3°04.7	5.4 - 1.1	11.4 - 2.4	17.4 - 3.6
55	3°13.7	3°14.3	3°04.9	5.5 - 1.1	11.5 - 2.4	17.5 - 3.6
56	3°14.0	3°14.5	3°05.2	5.6 - 1.2	11.6 - 2.4	17.6 - 3.7
57	3°14.2	3°14.8	3°05.4	5.7 - 1.2	11.7 - 2.4	17.7 - 3.7
58	3°14.5	3°15.0	3°05.6	5.8 - 1.2	11.8 - 2.5	17.8 - 3.7
59	3°14.7	3°15.3	3°05.9	5.9 - 1.2	11.9 - 2.5	17.9 - 3.7

m 13	Sun Plan.	Aries	Moon	v and d corr		
0	3°15.0	3°15.5	3°06.1	0.0 - 0.0	6.0 - 1.4	12.0 - 2.7
1	3°15.3	3°15.8	3°06.4	0.1 - 0.0	6.1 - 1.4	12.1 - 2.7
2	3°15.5	3°16.0	3°06.6	0.2 - 0.0	6.2 - 1.4	12.2 - 2.7
3	3°15.8	3°16.3	3°06.8	0.3 - 0.1	6.3 - 1.4	12.3 - 2.8
4	3°16.0	3°16.5	3°07.1	0.4 - 0.1	6.4 - 1.4	12.4 - 2.8
5	3°16.3	3°16.8	3°07.3	0.5 - 0.1	6.5 - 1.5	12.5 - 2.8
6	3°16.5	3°17.0	3°07.5	0.6 - 0.1	6.6 - 1.5	12.6 - 2.8
7	3°16.8	3°17.3	3°07.8	0.7 - 0.2	6.7 - 1.5	12.7 - 2.9
8	3°17.0	3°17.5	3°08.0	0.8 - 0.2	6.8 - 1.5	12.8 - 2.9
9	3°17.3	3°17.8	3°08.3	0.9 - 0.2	6.9 - 1.6	12.9 - 2.9
10	3°17.5	3°18.0	3°08.5	1.0 - 0.2	7.0 - 1.6	13.0 - 2.9
11	3°17.8	3°18.3	3°08.7	1.1 - 0.2	7.1 - 1.6	13.1 - 2.9
12	3°18.0	3°18.5	3°09.0	1.2 - 0.3	7.2 - 1.6	13.2 - 3.0
13	3°18.2	3°18.8	3°09.2	1.3 - 0.3	7.3 - 1.6	13.3 - 3.0
14	3°18.5	3°19.0	3°09.5	1.4 - 0.3	7.4 - 1.7	13.4 - 3.0
15	3°18.8	3°19.3	3°09.7	1.5 - 0.3	7.5 - 1.7	13.5 - 3.0
16	3°19.0	3°19.5	3°09.9	1.6 - 0.4	7.6 - 1.7	13.6 - 3.1
17	3°19.2	3°19.8	3°10.2	1.7 - 0.4	7.7 - 1.7	13.7 - 3.1
18	3°19.5	3°20.0	3°10.4	1.8 - 0.4	7.8 - 1.8	13.8 - 3.1
19	3°19.7	3°20.3	3°10.7	1.9 - 0.4	7.9 - 1.8	13.9 - 3.1
20	3°20.0	3°20.5	3°10.9	2.0 - 0.5	8.0 - 1.8	14.0 - 3.2
21	3°20.2	3°20.8	3°11.1	2.1 - 0.5	8.1 - 1.8	14.1 - 3.2
22	3°20.5	3°21.0	3°11.4	2.2 - 0.5	8.2 - 1.8	14.2 - 3.2
23	3°20.7	3°21.3	3°11.6	2.3 - 0.5	8.3 - 1.9	14.3 - 3.2
24	3°21.0	3°21.5	3°11.8	2.4 - 0.5	8.4 - 1.9	14.4 - 3.2
25	3°21.2	3°21.8	3°12.1	2.5 - 0.6	8.5 - 1.9	14.5 - 3.3
26	3°21.5	3°22.1	3°12.3	2.6 - 0.6	8.6 - 1.9	14.6 - 3.3
27	3°21.7	3°22.3	3°12.6	2.7 - 0.6	8.7 - 2.0	14.7 - 3.3
28	3°22.0	3°22.6	3°12.8	2.8 - 0.6	8.8 - 2.0	14.8 - 3.3
29	3°22.2	3°22.8	3°13.0	2.9 - 0.7	8.9 - 2.0	14.9 - 3.4
30	3°22.5	3°23.1	3°13.3	3.0 - 0.7	9.0 - 2.0	15.0 - 3.4
31	3°22.8	3°23.3	3°13.5	3.1 - 0.7	9.1 - 2.0	15.1 - 3.4
32	3°23.0	3°23.6	3°13.8	3.2 - 0.7	9.2 - 2.1	15.2 - 3.4
33	3°23.3	3°23.8	3°14.0	3.3 - 0.7	9.3 - 2.1	15.3 - 3.4
34	3°23.5	3°24.1	3°14.2	3.4 - 0.8	9.4 - 2.1	15.4 - 3.5
35	3°23.8	3°24.3	3°14.5	3.5 - 0.8	9.5 - 2.1	15.5 - 3.5
36	3°24.0	3°24.6	3°14.7	3.6 - 0.8	9.6 - 2.2	15.6 - 3.5
37	3°24.3	3°24.8	3°14.9	3.7 - 0.8	9.7 - 2.2	15.7 - 3.5
38	3°24.5	3°25.1	3°15.2	3.8 - 0.9	9.8 - 2.2	15.8 - 3.6
39	3°24.8	3°25.3	3°15.4	3.9 - 0.9	9.9 - 2.2	15.9 - 3.6
40	3°25.0	3°25.6	3°15.7	4.0 - 0.9	10.0 - 2.3	16.0 - 3.6
41	3°25.3	3°25.8	3°15.9	4.1 - 0.9	10.1 - 2.3	16.1 - 3.6
42	3°25.5	3°26.1	3°16.1	4.2 - 0.9	10.2 - 2.3	16.2 - 3.6
43	3°25.8	3°26.3	3°16.4	4.3 - 1.0	10.3 - 2.3	16.3 - 3.7
44	3°26.0	3°26.6	3°16.6	4.4 - 1.0	10.4 - 2.3	16.4 - 3.7
45	3°26.2	3°26.8	3°16.9	4.5 - 1.0	10.5 - 2.4	16.5 - 3.7
46	3°26.5	3°27.1	3°17.1	4.6 - 1.0	10.6 - 2.4	16.6 - 3.7
47	3°26.8	3°27.3	3°17.3	4.7 - 1.1	10.7 - 2.4	16.7 - 3.8
48	3°27.0	3°27.6	3°17.6	4.8 - 1.1	10.8 - 2.4	16.8 - 3.8
49	3°27.2	3°27.8	3°17.8	4.9 - 1.1	10.9 - 2.5	16.9 - 3.8
50	3°27.5	3°28.1	3°18.0	5.0 - 1.1	11.0 - 2.5	17.0 - 3.8
51	3°27.7	3°28.3	3°18.3	5.1 - 1.1	11.1 - 2.5	17.1 - 3.8
52	3°28.0	3°28.6	3°18.5	5.2 - 1.2	11.2 - 2.5	17.2 - 3.9
53	3°28.2	3°28.8	3°18.8	5.3 - 1.2	11.3 - 2.5	17.3 - 3.9
54	3°28.5	3°29.1	3°19.0	5.4 - 1.2	11.4 - 2.6	17.4 - 3.9
55	3°28.7	3°29.3	3°19.2	5.5 - 1.2	11.5 - 2.6	17.5 - 3.9
56	3°29.0	3°29.6	3°19.5	5.6 - 1.3	11.6 - 2.6	17.6 - 4.0
57	3°29.2	3°29.8	3°19.7	5.7 - 1.3	11.7 - 2.6	17.7 - 4.0
58	3°29.5	3°30.1	3°20.0	5.8 - 1.3	11.8 - 2.7	17.8 - 4.0
59	3°29.7	3°30.3	3°20.2	5.9 - 1.3	11.9 - 2.7	17.9 - 4.0

m 14	Sun Plan.	Aries	Moon	v and d corr		
0	3°30.0	3°30.6	3°20.4	0.0 - 0.0	6.0 - 1.5	12.0 - 2.9
1	3°30.3	3°30.8	3°20.7	0.1 - 0.0	6.1 - 1.5	12.1 - 2.9
2	3°30.5	3°31.1	3°20.9	0.2 - 0.0	6.2 - 1.5	12.2 - 2.9
3	3°30.8	3°31.3	3°21.1	0.3 - 0.1	6.3 - 1.5	12.3 - 3.0
4	3°31.0	3°31.6	3°21.4	0.4 - 0.1	6.4 - 1.5	12.4 - 3.0
5	3°31.3	3°31.8	3°21.6	0.5 - 0.1	6.5 - 1.6	12.5 - 3.0
6	3°31.5	3°32.1	3°21.9	0.6 - 0.1	6.6 - 1.6	12.6 - 3.0
7	3°31.8	3°32.3	3°22.1	0.7 - 0.2	6.7 - 1.6	12.7 - 3.1
8	3°32.0	3°32.6	3°22.3	0.8 - 0.2	6.8 - 1.6	12.8 - 3.1
9	3°32.3	3°32.8	3°22.6	0.9 - 0.2	6.9 - 1.7	12.9 - 3.1
10	3°32.5	3°33.1	3°22.8	1.0 - 0.2	7.0 - 1.7	13.0 - 3.1
11	3°32.8	3°33.3	3°23.1	1.1 - 0.3	7.1 - 1.7	13.1 - 3.2
12	3°33.0	3°33.6	3°23.3	1.2 - 0.3	7.2 - 1.7	13.2 - 3.2
13	3°33.2	3°33.8	3°23.5	1.3 - 0.3	7.3 - 1.8	13.3 - 3.2
14	3°33.5	3°34.1	3°23.8	1.4 - 0.3	7.4 - 1.8	13.4 - 3.2
15	3°33.8	3°34.3	3°24.0	1.5 - 0.4	7.5 - 1.8	13.5 - 3.3
16	3°34.0	3°34.6	3°24.3	1.6 - 0.4	7.6 - 1.8	13.6 - 3.3
17	3°34.2	3°34.8	3°24.5	1.7 - 0.4	7.7 - 1.9	13.7 - 3.3
18	3°34.5	3°35.1	3°24.7	1.8 - 0.4	7.8 - 1.9	13.8 - 3.3
19	3°34.8	3°35.3	3°25.0	1.9 - 0.5	7.9 - 1.9	13.9 - 3.4
20	3°35.0	3°35.6	3°25.2	2.0 - 0.5	8.0 - 1.9	14.0 - 3.4
21	3°35.2	3°35.8	3°25.4	2.1 - 0.5	8.1 - 2.0	14.1 - 3.4
22	3°35.5	3°36.1	3°25.7	2.2 - 0.5	8.2 - 2.0	14.2 - 3.4
23	3°35.7	3°36.3	3°25.9	2.3 - 0.6	8.3 - 2.0	14.3 - 3.5
24	3°36.0	3°36.6	3°26.2	2.4 - 0.6	8.4 - 2.0	14.4 - 3.5
25	3°36.2	3°36.8	3°26.4	2.5 - 0.6	8.5 - 2.1	14.5 - 3.5
26	3°36.5	3°37.1	3°26.6	2.6 - 0.6	8.6 - 2.1	14.6 - 3.5
27	3°36.7	3°37.3	3°26.9	2.7 - 0.7	8.7 - 2.1	14.7 - 3.6
28	3°37.0	3°37.6	3°27.1	2.8 - 0.7	8.8 - 2.1	14.8 - 3.6
29	3°37.2	3°37.8	3°27.4	2.9 - 0.7	8.9 - 2.2	14.9 - 3.6
30	3°37.5	3°38.1	3°27.6	3.0 - 0.7	9.0 - 2.2	15.0 - 3.6
31	3°37.8	3°38.3	3°27.8	3.1 - 0.7	9.1 - 2.2	15.1 - 3.6
32	3°38.0	3°38.6	3°28.1	3.2 - 0.8	9.2 - 2.2	15.2 - 3.7
33	3°38.3	3°38.8	3°28.3	3.3 - 0.8	9.3 - 2.2	15.3 - 3.7
34	3°38.5	3°39.1	3°28.5	3.4 - 0.8	9.4 - 2.3	15.4 - 3.7
35	3°38.8	3°39.3	3°28.8	3.5 - 0.8	9.5 - 2.3	15.5 - 3.7
36	3°39.0	3°39.6	3°29.0	3.6 - 0.9	9.6 - 2.3	15.6 - 3.8
37	3°39.3	3°39.8	3°29.3	3.7 - 0.9	9.7 - 2.3	15.7 - 3.8
38	3°39.5	3°40.1	3°29.5	3.8 - 0.9	9.8 - 2.4	15.8 - 3.8
39	3°39.8	3°40.4	3°29.7	3.9 - 0.9	9.9 - 2.4	15.9 - 3.8
40	3°40.0	3°40.6	3°30.0	4.0 - 1.0	10.0 - 2.4	16.0 - 3.9
41	3°40.2	3°40.9	3°30.2	4.1 - 1.0	10.1 - 2.4	16.1 - 3.9
42	3°40.5	3°41.1	3°30.5	4.2 - 1.0	10.2 - 2.5	16.2 - 3.9
43	3°40.8	3°41.4	3°30.7	4.3 - 1.0	10.3 - 2.5	16.3 - 3.9
44	3°41.0	3°41.6	3°30.9	4.4 - 1.1	10.4 - 2.5	16.4 - 4.0
45	3°41.2	3°41.9	3°31.2	4.5 - 1.1	10.5 - 2.5	16.5 - 4.0
46	3°41.5	3°42.1	3°31.4	4.6 - 1.1	10.6 - 2.6	16.6 - 4.0
47	3°41.8	3°42.4	3°31.6	4.7 - 1.1	10.7 - 2.6	16.7 - 4.0
48	3°42.0	3°42.6	3°31.9	4.8 - 1.2	10.8 - 2.6	16.8 - 4.1
49	3°42.2	3°42.9	3°32.1	4.9 - 1.2	10.9 - 2.6	16.9 - 4.1
50	3°42.5	3°43.1	3°32.4	5.0 - 1.2	11.0 - 2.7	17.0 - 4.1
51	3°42.7	3°43.4	3°32.6	5.1 - 1.2	11.1 - 2.7	17.1 - 4.1
52	3°43.0	3°43.6	3°32.8	5.2 - 1.3	11.2 - 2.7	17.2 - 4.2
53	3°43.2	3°43.9	3°33.1	5.3 - 1.3	11.3 - 2.7	17.3 - 4.2
54	3°43.5	3°44.1	3°33.3	5.4 - 1.3	11.4 - 2.8	17.4 - 4.2
55	3°43.7	3°44.4	3°33.6	5.5 - 1.3	11.5 - 2.8	17.5 - 4.2
56	3°44.0	3°44.6	3°33.8	5.6 - 1.4	11.6 - 2.8	17.6 - 4.3
57	3°44.2	3°44.9	3°34.0	5.7 - 1.4	11.7 - 2.8	17.7 - 4.3
58	3°44.5	3°45.1	3°34.3	5.8 - 1.4	11.8 - 2.9	17.8 - 4.3
59	3°44.7	3°45.4	3°34.5	5.9 - 1.4	11.9 - 2.9	17.9 - 4.3

Increments and Corrections

m 15	Sun Plan.	Aries	Moon	v and d corr		
0	3°45.0	3°45.6	3°34.8	0.0 - 0.0	6.0 - 1.6	12.0 - 3.1
1	3°45.2	3°45.9	3°35.0	0.1 - 0.0	6.1 - 1.6	12.1 - 3.1
2	3°45.5	3°46.1	3°35.2	0.2 - 0.1	6.2 - 1.6	12.2 - 3.2
3	3°45.8	3°46.4	3°35.5	0.3 - 0.1	6.3 - 1.6	12.3 - 3.2
4	3°46.0	3°46.6	3°35.7	0.4 - 0.1	6.4 - 1.7	12.4 - 3.2
5	3°46.2	3°46.9	3°35.9	0.5 - 0.1	6.5 - 1.7	12.5 - 3.2
6	3°46.5	3°47.1	3°36.2	0.6 - 0.2	6.6 - 1.7	12.6 - 3.3
7	3°46.8	3°47.4	3°36.4	0.7 - 0.2	6.7 - 1.7	12.7 - 3.3
8	3°47.0	3°47.6	3°36.7	0.8 - 0.2	6.8 - 1.8	12.8 - 3.3
9	3°47.3	3°47.9	3°36.9	0.9 - 0.2	6.9 - 1.8	12.9 - 3.3
10	3°47.5	3°48.1	3°37.1	1.0 - 0.3	7.0 - 1.8	13.0 - 3.4
11	3°47.7	3°48.4	3°37.4	1.1 - 0.3	7.1 - 1.8	13.1 - 3.4
12	3°48.0	3°48.6	3°37.6	1.2 - 0.3	7.2 - 1.9	13.2 - 3.4
13	3°48.2	3°48.9	3°37.9	1.3 - 0.3	7.3 - 1.9	13.3 - 3.4
14	3°48.5	3°49.1	3°38.1	1.4 - 0.4	7.4 - 1.9	13.4 - 3.5
15	3°48.8	3°49.4	3°38.3	1.5 - 0.4	7.5 - 1.9	13.5 - 3.5
16	3°49.0	3°49.6	3°38.6	1.6 - 0.4	7.6 - 2.0	13.6 - 3.5
17	3°49.3	3°49.9	3°38.8	1.7 - 0.4	7.7 - 2.0	13.7 - 3.5
18	3°49.5	3°50.1	3°39.0	1.8 - 0.5	7.8 - 2.0	13.8 - 3.6
19	3°49.8	3°50.4	3°39.3	1.9 - 0.5	7.9 - 2.0	13.9 - 3.6
20	3°50.0	3°50.6	3°39.5	2.0 - 0.5	8.0 - 2.1	14.0 - 3.6
21	3°50.2	3°50.9	3°39.8	2.1 - 0.5	8.1 - 2.1	14.1 - 3.6
22	3°50.5	3°51.1	3°40.0	2.2 - 0.6	8.2 - 2.1	14.2 - 3.7
23	3°50.7	3°51.4	3°40.2	2.3 - 0.6	8.3 - 2.1	14.3 - 3.7
24	3°51.0	3°51.6	3°40.5	2.4 - 0.6	8.4 - 2.2	14.4 - 3.7
25	3°51.2	3°51.9	3°40.7	2.5 - 0.6	8.5 - 2.2	14.5 - 3.7
26	3°51.5	3°52.1	3°41.0	2.6 - 0.7	8.6 - 2.2	14.6 - 3.8
27	3°51.8	3°52.4	3°41.2	2.7 - 0.7	8.7 - 2.2	14.7 - 3.8
28	3°52.0	3°52.6	3°41.4	2.8 - 0.7	8.8 - 2.3	14.8 - 3.8
29	3°52.2	3°52.9	3°41.7	2.9 - 0.7	8.9 - 2.3	14.9 - 3.8
30	3°52.5	3°53.1	3°41.9	3.0 - 0.8	9.0 - 2.3	15.0 - 3.9
31	3°52.8	3°53.4	3°42.1	3.1 - 0.8	9.1 - 2.4	15.1 - 3.9
32	3°53.0	3°53.6	3°42.4	3.2 - 0.8	9.2 - 2.4	15.2 - 3.9
33	3°53.2	3°53.9	3°42.6	3.3 - 0.9	9.3 - 2.4	15.3 - 4.0
34	3°53.5	3°54.1	3°42.9	3.4 - 0.9	9.4 - 2.4	15.4 - 4.0
35	3°53.8	3°54.4	3°43.1	3.5 - 0.9	9.5 - 2.5	15.5 - 4.0
36	3°54.0	3°54.6	3°43.3	3.6 - 0.9	9.6 - 2.5	15.6 - 4.0
37	3°54.3	3°54.9	3°43.6	3.7 - 1.0	9.7 - 2.5	15.7 - 4.1
38	3°54.5	3°55.1	3°43.8	3.8 - 1.0	9.8 - 2.5	15.8 - 4.1
39	3°54.8	3°55.4	3°44.1	3.9 - 1.0	9.9 - 2.6	15.9 - 4.1
40	3°55.0	3°55.6	3°44.3	4.0 - 1.0	10.0 - 2.6	16.0 - 4.1
41	3°55.2	3°55.9	3°44.5	4.1 - 1.1	10.1 - 2.6	16.1 - 4.2
42	3°55.5	3°56.1	3°44.8	4.2 - 1.1	10.2 - 2.6	16.2 - 4.2
43	3°55.7	3°56.4	3°45.0	4.3 - 1.1	10.3 - 2.7	16.3 - 4.2
44	3°56.0	3°56.6	3°45.2	4.4 - 1.1	10.4 - 2.7	16.4 - 4.2
45	3°56.2	3°56.9	3°45.5	4.5 - 1.2	10.5 - 2.7	16.5 - 4.3
46	3°56.5	3°57.1	3°45.7	4.6 - 1.2	10.6 - 2.7	16.6 - 4.3
47	3°56.8	3°57.4	3°46.0	4.7 - 1.2	10.7 - 2.8	16.7 - 4.3
48	3°57.0	3°57.6	3°46.2	4.8 - 1.2	10.8 - 2.8	16.8 - 4.3
49	3°57.3	3°57.9	3°46.4	4.9 - 1.3	10.9 - 2.8	16.9 - 4.4
50	3°57.5	3°58.1	3°46.7	5.0 - 1.3	11.0 - 2.8	17.0 - 4.4
51	3°57.7	3°58.4	3°46.9	5.1 - 1.3	11.1 - 2.9	17.1 - 4.4
52	3°58.0	3°58.7	3°47.2	5.2 - 1.3	11.2 - 2.9	17.2 - 4.4
53	3°58.2	3°58.9	3°47.4	5.3 - 1.4	11.3 - 2.9	17.3 - 4.5
54	3°58.5	3°59.2	3°47.6	5.4 - 1.4	11.4 - 2.9	17.4 - 4.5
55	3°58.7	3°59.4	3°47.9	5.5 - 1.4	11.5 - 3.0	17.5 - 4.5
56	3°59.0	3°59.7	3°48.1	5.6 - 1.4	11.6 - 3.0	17.6 - 4.5
57	3°59.2	3°59.9	3°48.4	5.7 - 1.5	11.7 - 3.0	17.7 - 4.6
58	3°59.5	4°00.2	3°48.6	5.8 - 1.5	11.8 - 3.0	17.8 - 4.6
59	3°59.8	4°00.4	3°48.8	5.9 - 1.5	11.9 - 3.1	17.9 - 4.6

m 16	Sun Plan.	Aries	Moon	v and d corr		
0	4°00.0	4°00.7	3°49.1	0.0 - 0.0	6.0 - 1.7	12.0 - 3.3
1	4°00.2	4°00.9	3°49.3	0.1 - 0.0	6.1 - 1.7	12.1 - 3.3
2	4°00.5	4°01.2	3°49.5	0.2 - 0.1	6.2 - 1.7	12.2 - 3.4
3	4°00.8	4°01.4	3°49.8	0.3 - 0.1	6.3 - 1.7	12.3 - 3.4
4	4°01.0	4°01.7	3°50.0	0.4 - 0.1	6.4 - 1.8	12.4 - 3.4
5	4°01.2	4°01.9	3°50.3	0.5 - 0.1	6.5 - 1.8	12.5 - 3.4
6	4°01.5	4°02.2	3°50.5	0.6 - 0.2	6.6 - 1.8	12.6 - 3.5
7	4°01.8	4°02.4	3°50.7	0.7 - 0.2	6.7 - 1.8	12.7 - 3.5
8	4°02.0	4°02.7	3°51.0	0.8 - 0.2	6.8 - 1.9	12.8 - 3.5
9	4°02.2	4°02.9	3°51.2	0.9 - 0.2	6.9 - 1.9	12.9 - 3.5
10	4°02.5	4°03.2	3°51.5	1.0 - 0.3	7.0 - 1.9	13.0 - 3.6
11	4°02.8	4°03.4	3°51.7	1.1 - 0.3	7.1 - 2.0	13.1 - 3.6
12	4°03.0	4°03.7	3°51.9	1.2 - 0.3	7.2 - 2.0	13.2 - 3.6
13	4°03.2	4°03.9	3°52.2	1.3 - 0.4	7.3 - 2.0	13.3 - 3.7
14	4°03.5	4°04.2	3°52.4	1.4 - 0.4	7.4 - 2.0	13.4 - 3.7
15	4°03.8	4°04.4	3°52.6	1.5 - 0.4	7.5 - 2.1	13.5 - 3.7
16	4°04.0	4°04.7	3°52.9	1.6 - 0.4	7.6 - 2.1	13.6 - 3.7
17	4°04.3	4°04.9	3°53.1	1.7 - 0.5	7.7 - 2.1	13.7 - 3.8
18	4°04.5	4°05.2	3°53.4	1.8 - 0.5	7.8 - 2.1	13.8 - 3.8
19	4°04.7	4°05.4	3°53.6	1.9 - 0.5	7.9 - 2.2	13.9 - 3.8
20	4°05.0	4°05.7	3°53.8	2.0 - 0.6	8.0 - 2.2	14.0 - 3.9
21	4°05.3	4°05.9	3°54.1	2.1 - 0.6	8.1 - 2.2	14.1 - 3.9
22	4°05.5	4°06.2	3°54.3	2.2 - 0.6	8.2 - 2.3	14.2 - 3.9
23	4°05.7	4°06.4	3°54.6	2.3 - 0.6	8.3 - 2.3	14.3 - 3.9
24	4°06.0	4°06.7	3°54.8	2.4 - 0.7	8.4 - 2.3	14.4 - 4.0
25	4°06.3	4°06.9	3°55.0	2.5 - 0.7	8.5 - 2.3	14.5 - 4.0
26	4°06.5	4°07.2	3°55.3	2.6 - 0.7	8.6 - 2.4	14.6 - 4.0
27	4°06.7	4°07.4	3°55.5	2.7 - 0.7	8.7 - 2.4	14.7 - 4.0
28	4°07.0	4°07.7	3°55.7	2.8 - 0.8	8.8 - 2.4	14.8 - 4.1
29	4°07.3	4°07.9	3°56.0	2.9 - 0.8	8.9 - 2.4	14.9 - 4.1
30	4°07.5	4°08.2	3°56.2	3.0 - 0.8	9.0 - 2.5	15.0 - 4.1
31	4°07.7	4°08.4	3°56.5	3.1 - 0.9	9.1 - 2.5	15.1 - 4.2
32	4°08.0	4°08.7	3°56.7	3.2 - 0.9	9.2 - 2.5	15.2 - 4.2
33	4°08.3	4°08.9	3°56.9	3.3 - 0.9	9.3 - 2.6	15.3 - 4.2
34	4°08.5	4°09.2	3°57.2	3.4 - 0.9	9.4 - 2.6	15.4 - 4.2
35	4°08.7	4°09.4	3°57.4	3.5 - 1.0	9.5 - 2.6	15.5 - 4.3
36	4°09.0	4°09.7	3°57.7	3.6 - 1.0	9.6 - 2.6	15.6 - 4.3
37	4°09.3	4°09.9	3°57.9	3.7 - 1.0	9.7 - 2.7	15.7 - 4.3
38	4°09.5	4°10.2	3°58.1	3.8 - 1.0	9.8 - 2.7	15.8 - 4.3
39	4°09.7	4°10.4	3°58.4	3.9 - 1.1	9.9 - 2.7	15.9 - 4.4
40	4°10.0	4°10.7	3°58.6	4.0 - 1.1	10.0 - 2.8	16.0 - 4.4
41	4°10.3	4°10.9	3°58.8	4.1 - 1.1	10.1 - 2.8	16.1 - 4.4
42	4°10.5	4°11.2	3°59.1	4.2 - 1.2	10.2 - 2.8	16.2 - 4.5
43	4°10.7	4°11.4	3°59.3	4.3 - 1.2	10.3 - 2.8	16.3 - 4.5
44	4°11.0	4°11.7	3°59.6	4.4 - 1.2	10.4 - 2.9	16.4 - 4.5
45	4°11.2	4°11.9	3°59.8	4.5 - 1.2	10.5 - 2.9	16.5 - 4.5
46	4°11.5	4°12.2	4°00.0	4.6 - 1.3	10.6 - 2.9	16.6 - 4.6
47	4°11.8	4°12.4	4°00.3	4.7 - 1.3	10.7 - 2.9	16.7 - 4.6
48	4°12.0	4°12.7	4°00.5	4.8 - 1.3	10.8 - 3.0	16.8 - 4.6
49	4°12.2	4°12.9	4°00.8	4.9 - 1.3	10.9 - 3.0	16.9 - 4.6
50	4°12.5	4°13.2	4°01.0	5.0 - 1.4	11.0 - 3.0	17.0 - 4.7
51	4°12.8	4°13.4	4°01.2	5.1 - 1.4	11.1 - 3.1	17.1 - 4.7
52	4°13.0	4°13.7	4°01.5	5.2 - 1.4	11.2 - 3.1	17.2 - 4.7
53	4°13.2	4°13.9	4°01.7	5.3 - 1.5	11.3 - 3.1	17.3 - 4.8
54	4°13.5	4°14.2	4°02.0	5.4 - 1.5	11.4 - 3.1	17.4 - 4.8
55	4°13.8	4°14.4	4°02.2	5.5 - 1.5	11.5 - 3.2	17.5 - 4.8
56	4°14.0	4°14.7	4°02.4	5.6 - 1.5	11.6 - 3.2	17.6 - 4.8
57	4°14.2	4°14.9	4°02.7	5.7 - 1.6	11.7 - 3.2	17.7 - 4.9
58	4°14.5	4°15.2	4°02.9	5.8 - 1.6	11.8 - 3.2	17.8 - 4.9
59	4°14.8	4°15.4	4°03.1	5.9 - 1.6	11.9 - 3.3	17.9 - 4.9

m 17	Sun Plan.	Aries	Moon	v and d corr		
0	4°15.0	4°15.7	4°03.4	0.0 - 0.0	6.0 - 1.8	12.0 - 3.5
1	4°15.2	4°15.9	4°03.6	0.1 - 0.0	6.1 - 1.8	12.1 - 3.5
2	4°15.5	4°16.2	4°03.9	0.2 - 0.1	6.2 - 1.8	12.2 - 3.6
3	4°15.8	4°16.4	4°04.1	0.3 - 0.1	6.3 - 1.8	12.3 - 3.6
4	4°16.0	4°16.7	4°04.3	0.4 - 0.1	6.4 - 1.9	12.4 - 3.6
5	4°16.2	4°17.0	4°04.6	0.5 - 0.1	6.5 - 1.9	12.5 - 3.6
6	4°16.5	4°17.2	4°04.8	0.6 - 0.2	6.6 - 1.9	12.6 - 3.7
7	4°16.8	4°17.5	4°05.1	0.7 - 0.2	6.7 - 2.0	12.7 - 3.7
8	4°17.0	4°17.7	4°05.3	0.8 - 0.2	6.8 - 2.0	12.8 - 3.7
9	4°17.2	4°18.0	4°05.5	0.9 - 0.3	6.9 - 2.0	12.9 - 3.8
10	4°17.5	4°18.2	4°05.8	1.0 - 0.3	7.0 - 2.0	13.0 - 3.8
11	4°17.8	4°18.5	4°06.0	1.1 - 0.3	7.1 - 2.1	13.1 - 3.8
12	4°18.0	4°18.7	4°06.2	1.2 - 0.4	7.2 - 2.1	13.2 - 3.9
13	4°18.2	4°19.0	4°06.5	1.3 - 0.4	7.3 - 2.1	13.3 - 3.9
14	4°18.5	4°19.2	4°06.7	1.4 - 0.4	7.4 - 2.2	13.4 - 3.9
15	4°18.8	4°19.5	4°07.0	1.5 - 0.4	7.5 - 2.2	13.5 - 3.9
16	4°19.0	4°19.7	4°07.2	1.6 - 0.5	7.6 - 2.2	13.6 - 4.0
17	4°19.3	4°20.0	4°07.4	1.7 - 0.5	7.7 - 2.2	13.7 - 4.0
18	4°19.5	4°20.2	4°07.7	1.8 - 0.5	7.8 - 2.3	13.8 - 4.0
19	4°19.7	4°20.5	4°07.9	1.9 - 0.6	7.9 - 2.3	13.9 - 4.1
20	4°20.0	4°20.7	4°08.2	2.0 - 0.6	8.0 - 2.3	14.0 - 4.1
21	4°20.3	4°21.0	4°08.4	2.1 - 0.6	8.1 - 2.4	14.1 - 4.1
22	4°20.5	4°21.2	4°08.6	2.2 - 0.6	8.2 - 2.4	14.2 - 4.1
23	4°20.7	4°21.5	4°08.9	2.3 - 0.7	8.3 - 2.4	14.3 - 4.2
24	4°21.0	4°21.7	4°09.1	2.4 - 0.7	8.4 - 2.5	14.4 - 4.2
25	4°21.3	4°22.0	4°09.3	2.5 - 0.7	8.5 - 2.5	14.5 - 4.2
26	4°21.5	4°22.2	4°09.6	2.6 - 0.8	8.6 - 2.5	14.6 - 4.3
27	4°21.7	4°22.5	4°09.8	2.7 - 0.8	8.7 - 2.5	14.7 - 4.3
28	4°22.0	4°22.7	4°10.1	2.8 - 0.8	8.8 - 2.6	14.8 - 4.3
29	4°22.3	4°23.0	4°10.3	2.9 - 0.8	8.9 - 2.6	14.9 - 4.3
30	4°22.5	4°23.2	4°10.5	3.0 - 0.9	9.0 - 2.6	15.0 - 4.4
31	4°22.7	4°23.5	4°10.8	3.1 - 0.9	9.1 - 2.7	15.1 - 4.4
32	4°23.0	4°23.7	4°11.0	3.2 - 0.9	9.2 - 2.7	15.2 - 4.4
33	4°23.3	4°24.0	4°11.3	3.3 - 1.0	9.3 - 2.7	15.3 - 4.5
34	4°23.5	4°24.2	4°11.5	3.4 - 1.0	9.4 - 2.7	15.4 - 4.5
35	4°23.7	4°24.5	4°11.7	3.5 - 1.0	9.5 - 2.8	15.5 - 4.5
36	4°24.0	4°24.7	4°12.0	3.6 - 1.1	9.6 - 2.8	15.6 - 4.6
37	4°24.3	4°25.0	4°12.2	3.7 - 1.1	9.7 - 2.8	15.7 - 4.6
38	4°24.5	4°25.2	4°12.5	3.8 - 1.1	9.8 - 2.9	15.8 - 4.6
39	4°24.7	4°25.5	4°12.7	3.9 - 1.1	9.9 - 2.9	15.9 - 4.6
40	4°25.0	4°25.7	4°12.9	4.0 - 1.2	10.0 - 2.9	16.0 - 4.7
41	4°25.3	4°26.0	4°13.2	4.1 - 1.2	10.1 - 2.9	16.1 - 4.7
42	4°25.5	4°26.2	4°13.4	4.2 - 1.2	10.2 - 3.0	16.2 - 4.7
43	4°25.7	4°26.5	4°13.6	4.3 - 1.3	10.3 - 3.0	16.3 - 4.8
44	4°26.0	4°26.7	4°13.9	4.4 - 1.3	10.4 - 3.0	16.4 - 4.8
45	4°26.2	4°27.0	4°14.1	4.5 - 1.3	10.5 - 3.1	16.5 - 4.8
46	4°26.5	4°27.2	4°14.4	4.6 - 1.3	10.6 - 3.1	16.6 - 4.8
47	4°26.8	4°27.5	4°14.6	4.7 - 1.4	10.7 - 3.1	16.7 - 4.9
48	4°27.0	4°27.7	4°14.8	4.8 - 1.4	10.8 - 3.2	16.8 - 4.9
49	4°27.2	4°28.0	4°15.1	4.9 - 1.4	10.9 - 3.2	16.9 - 4.9
50	4°27.5	4°28.2	4°15.3	5.0 - 1.5	11.0 - 3.2	17.0 - 5.0
51	4°27.8	4°28.5	4°15.6	5.1 - 1.5	11.1 - 3.2	17.1 - 5.0
52	4°28.0	4°28.7	4°15.8	5.2 - 1.5	11.2 - 3.3	17.2 - 5.0
53	4°28.2	4°29.0	4°16.0	5.3 - 1.5	11.3 - 3.3	17.3 - 5.0
54	4°28.5	4°29.2	4°16.3	5.4 - 1.6	11.4 - 3.3	17.4 - 5.1
55	4°28.8	4°29.5	4°16.5	5.5 - 1.6	11.5 - 3.4	17.5 - 5.1
56	4°29.0	4°29.7	4°16.7	5.6 - 1.6	11.6 - 3.4	17.6 - 5.1
57	4°29.2	4°30.0	4°17.0	5.7 - 1.7	11.7 - 3.4	17.7 - 5.2
58	4°29.5	4°30.2	4°17.2	5.8 - 1.7	11.8 - 3.4	17.8 - 5.2
59	4°29.8	4°30.5	4°17.5	5.9 - 1.7	11.9 - 3.5	17.9 - 5.2

Increments and Corrections

m 18	Sun Plan.	Aries	Moon	v and d corr		
0	4°30.0	4°30.7	4°17.7	0.0 - 0.0	6.0 - 1.9	12.0 - 3.7
1	4°30.2	4°31.0	4°17.9	0.1 - 0.0	6.1 - 1.9	12.1 - 3.7
2	4°30.5	4°31.2	4°18.2	0.2 - 0.1	6.2 - 1.9	12.2 - 3.8
3	4°30.8	4°31.5	4°18.4	0.3 - 0.1	6.3 - 1.9	12.3 - 3.8
4	4°31.0	4°31.7	4°18.7	0.4 - 0.1	6.4 - 2.0	12.4 - 3.8
5	4°31.2	4°32.0	4°18.9	0.5 - 0.2	6.5 - 2.0	12.5 - 3.9
6	4°31.5	4°32.2	4°19.1	0.6 - 0.2	6.6 - 2.0	12.6 - 3.9
7	4°31.8	4°32.5	4°19.4	0.7 - 0.2	6.7 - 2.1	12.7 - 3.9
8	4°32.0	4°32.7	4°19.6	0.8 - 0.2	6.8 - 2.1	12.8 - 3.9
9	4°32.2	4°33.0	4°19.8	0.9 - 0.3	6.9 - 2.1	12.9 - 4.0
10	4°32.5	4°33.2	4°20.1	1.0 - 0.3	7.0 - 2.2	13.0 - 4.0
11	4°32.8	4°33.5	4°20.3	1.1 - 0.3	7.1 - 2.2	13.1 - 4.0
12	4°33.0	4°33.7	4°20.6	1.2 - 0.4	7.2 - 2.2	13.2 - 4.1
13	4°33.2	4°34.0	4°20.8	1.3 - 0.4	7.3 - 2.3	13.3 - 4.1
14	4°33.5	4°34.2	4°21.0	1.4 - 0.4	7.4 - 2.3	13.4 - 4.1
15	4°33.8	4°34.5	4°21.3	1.5 - 0.5	7.5 - 2.3	13.5 - 4.2
16	4°34.0	4°34.7	4°21.5	1.6 - 0.5	7.6 - 2.3	13.6 - 4.2
17	4°34.3	4°35.0	4°21.8	1.7 - 0.5	7.7 - 2.4	13.7 - 4.2
18	4°34.5	4°35.3	4°22.0	1.8 - 0.6	7.8 - 2.4	13.8 - 4.3
19	4°34.8	4°35.5	4°22.2	1.9 - 0.6	7.9 - 2.4	13.9 - 4.3
20	4°35.0	4°35.8	4°22.5	2.0 - 0.6	8.0 - 2.5	14.0 - 4.3
21	4°35.3	4°36.0	4°22.7	2.1 - 0.6	8.1 - 2.5	14.1 - 4.3
22	4°35.5	4°36.3	4°22.9	2.2 - 0.7	8.2 - 2.5	14.2 - 4.4
23	4°35.7	4°36.5	4°23.2	2.3 - 0.7	8.3 - 2.6	14.3 - 4.4
24	4°36.0	4°36.8	4°23.4	2.4 - 0.7	8.4 - 2.6	14.4 - 4.4
25	4°36.3	4°37.0	4°23.7	2.5 - 0.8	8.5 - 2.6	14.5 - 4.5
26	4°36.5	4°37.3	4°23.9	2.6 - 0.8	8.6 - 2.7	14.6 - 4.5
27	4°36.7	4°37.5	4°24.1	2.7 - 0.8	8.7 - 2.7	14.7 - 4.5
28	4°37.0	4°37.8	4°24.4	2.8 - 0.9	8.8 - 2.7	14.8 - 4.6
29	4°37.3	4°38.0	4°24.6	2.9 - 0.9	8.9 - 2.7	14.9 - 4.6
30	4°37.5	4°38.3	4°24.9	3.0 - 0.9	9.0 - 2.8	15.0 - 4.6
31	4°37.7	4°38.5	4°25.1	3.1 - 1.0	9.1 - 2.8	15.1 - 4.7
32	4°38.0	4°38.8	4°25.3	3.2 - 1.0	9.2 - 2.8	15.2 - 4.7
33	4°38.3	4°39.0	4°25.6	3.3 - 1.0	9.3 - 2.9	15.3 - 4.7
34	4°38.5	4°39.3	4°25.8	3.4 - 1.0	9.4 - 2.9	15.4 - 4.7
35	4°38.7	4°39.5	4°26.1	3.5 - 1.1	9.5 - 2.9	15.5 - 4.8
36	4°39.0	4°39.8	4°26.3	3.6 - 1.1	9.6 - 3.0	15.6 - 4.8
37	4°39.3	4°40.0	4°26.5	3.7 - 1.1	9.7 - 3.0	15.7 - 4.8
38	4°39.5	4°40.3	4°26.8	3.8 - 1.2	9.8 - 3.0	15.8 - 4.9
39	4°39.7	4°40.5	4°27.0	3.9 - 1.2	9.9 - 3.1	15.9 - 4.9
40	4°40.0	4°40.8	4°27.2	4.0 - 1.2	10.0 - 3.1	16.0 - 4.9
41	4°40.2	4°41.0	4°27.5	4.1 - 1.3	10.1 - 3.1	16.1 - 5.0
42	4°40.5	4°41.3	4°27.7	4.2 - 1.3	10.2 - 3.1	16.2 - 5.0
43	4°40.7	4°41.5	4°28.0	4.3 - 1.3	10.3 - 3.2	16.3 - 5.0
44	4°41.0	4°41.8	4°28.2	4.4 - 1.4	10.4 - 3.2	16.4 - 5.1
45	4°41.2	4°42.0	4°28.4	4.5 - 1.4	10.5 - 3.2	16.5 - 5.1
46	4°41.5	4°42.3	4°28.7	4.6 - 1.4	10.6 - 3.3	16.6 - 5.1
47	4°41.8	4°42.5	4°28.9	4.7 - 1.4	10.7 - 3.3	16.7 - 5.1
48	4°42.0	4°42.8	4°29.2	4.8 - 1.5	10.8 - 3.3	16.8 - 5.2
49	4°42.2	4°43.0	4°29.4	4.9 - 1.5	10.9 - 3.4	16.9 - 5.2
50	4°42.5	4°43.3	4°29.6	5.0 - 1.5	11.0 - 3.4	17.0 - 5.2
51	4°42.8	4°43.5	4°29.9	5.1 - 1.6	11.1 - 3.4	17.1 - 5.3
52	4°43.0	4°43.8	4°30.1	5.2 - 1.6	11.2 - 3.5	17.2 - 5.3
53	4°43.2	4°44.0	4°30.3	5.3 - 1.6	11.3 - 3.5	17.3 - 5.3
54	4°43.5	4°44.3	4°30.6	5.4 - 1.7	11.4 - 3.5	17.4 - 5.4
55	4°43.8	4°44.5	4°30.8	5.5 - 1.7	11.5 - 3.5	17.5 - 5.4
56	4°44.0	4°44.8	4°31.1	5.6 - 1.7	11.6 - 3.6	17.6 - 5.4
57	4°44.2	4°45.0	4°31.3	5.7 - 1.8	11.7 - 3.6	17.7 - 5.5
58	4°44.5	4°45.3	4°31.5	5.8 - 1.8	11.8 - 3.6	17.8 - 5.5
59	4°44.8	4°45.5	4°31.8	5.9 - 1.8	11.9 - 3.7	17.9 - 5.5

m 19	Sun Plan.	Aries	Moon	v and d corr		
0	4°45.0	4°45.8	4°32.0	0.0 - 0.0	6.0 - 2.0	12.0 - 3.9
1	4°45.2	4°46.0	4°32.3	0.1 - 0.0	6.1 - 2.0	12.1 - 3.9
2	4°45.5	4°46.3	4°32.5	0.2 - 0.1	6.2 - 2.0	12.2 - 4.0
3	4°45.8	4°46.5	4°32.7	0.3 - 0.1	6.3 - 2.0	12.3 - 4.0
4	4°46.0	4°46.8	4°33.0	0.4 - 0.1	6.4 - 2.1	12.4 - 4.0
5	4°46.2	4°47.0	4°33.2	0.5 - 0.2	6.5 - 2.1	12.5 - 4.1
6	4°46.5	4°47.3	4°33.4	0.6 - 0.2	6.6 - 2.1	12.6 - 4.1
7	4°46.8	4°47.5	4°33.7	0.7 - 0.2	6.7 - 2.2	12.7 - 4.1
8	4°47.0	4°47.8	4°33.9	0.8 - 0.3	6.8 - 2.2	12.8 - 4.2
9	4°47.2	4°48.0	4°34.2	0.9 - 0.3	6.9 - 2.2	12.9 - 4.2
10	4°47.5	4°48.3	4°34.4	1.0 - 0.3	7.0 - 2.3	13.0 - 4.2
11	4°47.8	4°48.5	4°34.6	1.1 - 0.4	7.1 - 2.3	13.1 - 4.3
12	4°48.0	4°48.8	4°34.9	1.2 - 0.4	7.2 - 2.3	13.2 - 4.3
13	4°48.2	4°49.0	4°35.1	1.3 - 0.4	7.3 - 2.4	13.3 - 4.3
14	4°48.5	4°49.3	4°35.4	1.4 - 0.5	7.4 - 2.4	13.4 - 4.4
15	4°48.8	4°49.5	4°35.6	1.5 - 0.5	7.5 - 2.4	13.5 - 4.4
16	4°49.0	4°49.8	4°35.8	1.6 - 0.5	7.6 - 2.5	13.6 - 4.4
17	4°49.3	4°50.0	4°36.1	1.7 - 0.6	7.7 - 2.5	13.7 - 4.5
18	4°49.5	4°50.3	4°36.3	1.8 - 0.6	7.8 - 2.5	13.8 - 4.5
19	4°49.8	4°50.5	4°36.6	1.9 - 0.6	7.9 - 2.6	13.9 - 4.5
20	4°50.0	4°50.8	4°36.8	2.0 - 0.7	8.0 - 2.6	14.0 - 4.6
21	4°50.3	4°51.0	4°37.0	2.1 - 0.7	8.1 - 2.6	14.1 - 4.6
22	4°50.5	4°51.3	4°37.3	2.2 - 0.7	8.2 - 2.7	14.2 - 4.6
23	4°50.7	4°51.5	4°37.5	2.3 - 0.7	8.3 - 2.7	14.3 - 4.6
24	4°51.0	4°51.8	4°37.7	2.4 - 0.8	8.4 - 2.7	14.4 - 4.7
25	4°51.3	4°52.0	4°38.0	2.5 - 0.8	8.5 - 2.8	14.5 - 4.7
26	4°51.5	4°52.3	4°38.2	2.6 - 0.8	8.6 - 2.8	14.6 - 4.7
27	4°51.7	4°52.5	4°38.5	2.7 - 0.9	8.7 - 2.8	14.7 - 4.8
28	4°52.0	4°52.8	4°38.7	2.8 - 0.9	8.8 - 2.9	14.8 - 4.8
29	4°52.3	4°53.0	4°38.9	2.9 - 0.9	8.9 - 2.9	14.9 - 4.8
30	4°52.5	4°53.3	4°39.2	3.0 - 1.0	9.0 - 2.9	15.0 - 4.9
31	4°52.7	4°53.6	4°39.4	3.1 - 1.0	9.1 - 3.0	15.1 - 4.9
32	4°53.0	4°53.8	4°39.7	3.2 - 1.0	9.2 - 3.0	15.2 - 4.9
33	4°53.3	4°54.1	4°39.9	3.3 - 1.1	9.3 - 3.0	15.3 - 5.0
34	4°53.5	4°54.3	4°40.1	3.4 - 1.1	9.4 - 3.1	15.4 - 5.0
35	4°53.7	4°54.6	4°40.4	3.5 - 1.1	9.5 - 3.1	15.5 - 5.0
36	4°54.0	4°54.8	4°40.6	3.6 - 1.2	9.6 - 3.1	15.6 - 5.1
37	4°54.3	4°55.1	4°40.8	3.7 - 1.2	9.7 - 3.2	15.7 - 5.1
38	4°54.5	4°55.3	4°41.1	3.8 - 1.2	9.8 - 3.2	15.8 - 5.1
39	4°54.7	4°55.6	4°41.3	3.9 - 1.3	9.9 - 3.2	15.9 - 5.2
40	4°55.0	4°55.8	4°41.6	4.0 - 1.3	10.0 - 3.3	16.0 - 5.2
41	4°55.2	4°56.1	4°41.8	4.1 - 1.3	10.1 - 3.3	16.1 - 5.2
42	4°55.5	4°56.3	4°42.0	4.2 - 1.4	10.2 - 3.3	16.2 - 5.3
43	4°55.7	4°56.6	4°42.3	4.3 - 1.4	10.3 - 3.3	16.3 - 5.3
44	4°56.0	4°56.8	4°42.5	4.4 - 1.4	10.4 - 3.4	16.4 - 5.3
45	4°56.2	4°57.1	4°42.8	4.5 - 1.5	10.5 - 3.4	16.5 - 5.4
46	4°56.5	4°57.3	4°43.0	4.6 - 1.5	10.6 - 3.4	16.6 - 5.4
47	4°56.8	4°57.6	4°43.2	4.7 - 1.5	10.7 - 3.5	16.7 - 5.4
48	4°57.0	4°57.8	4°43.5	4.8 - 1.6	10.8 - 3.5	16.8 - 5.5
49	4°57.2	4°58.1	4°43.7	4.9 - 1.6	10.9 - 3.5	16.9 - 5.5
50	4°57.5	4°58.3	4°43.9	5.0 - 1.6	11.0 - 3.6	17.0 - 5.5
51	4°57.8	4°58.6	4°44.2	5.1 - 1.7	11.1 - 3.6	17.1 - 5.6
52	4°58.0	4°58.8	4°44.4	5.2 - 1.7	11.2 - 3.6	17.2 - 5.6
53	4°58.2	4°59.1	4°44.7	5.3 - 1.7	11.3 - 3.7	17.3 - 5.6
54	4°58.5	4°59.3	4°44.9	5.4 - 1.8	11.4 - 3.7	17.4 - 5.7
55	4°58.8	4°59.6	4°45.1	5.5 - 1.8	11.5 - 3.7	17.5 - 5.7
56	4°59.0	4°59.8	4°45.4	5.6 - 1.8	11.6 - 3.8	17.6 - 5.7
57	4°59.2	5°00.1	4°45.6	5.7 - 1.9	11.7 - 3.8	17.7 - 5.8
58	4°59.5	5°00.3	4°45.9	5.8 - 1.9	11.8 - 3.8	17.8 - 5.8
59	4°59.8	5°00.6	4°46.1	5.9 - 1.9	11.9 - 3.9	17.9 - 5.8

m 20	Sun Plan.	Aries	Moon	v and d corr		
0	5°00.0	5°00.8	4°46.3	0.0 - 0.0	6.0 - 2.1	12.0 - 4.1
1	5°00.2	5°01.1	4°46.6	0.1 - 0.0	6.1 - 2.1	12.1 - 4.1
2	5°00.5	5°01.3	4°46.8	0.2 - 0.1	6.2 - 2.1	12.2 - 4.2
3	5°00.8	5°01.6	4°47.0	0.3 - 0.1	6.3 - 2.2	12.3 - 4.2
4	5°01.0	5°01.8	4°47.3	0.4 - 0.1	6.4 - 2.2	12.4 - 4.2
5	5°01.2	5°02.1	4°47.5	0.5 - 0.2	6.5 - 2.2	12.5 - 4.3
6	5°01.5	5°02.3	4°47.8	0.6 - 0.2	6.6 - 2.3	12.6 - 4.3
7	5°01.8	5°02.6	4°48.0	0.7 - 0.2	6.7 - 2.3	12.7 - 4.3
8	5°02.0	5°02.8	4°48.2	0.8 - 0.3	6.8 - 2.3	12.8 - 4.4
9	5°02.2	5°03.1	4°48.5	0.9 - 0.3	6.9 - 2.4	12.9 - 4.4
10	5°02.5	5°03.3	4°48.7	1.0 - 0.3	7.0 - 2.4	13.0 - 4.4
11	5°02.8	5°03.6	4°49.0	1.1 - 0.4	7.1 - 2.4	13.1 - 4.5
12	5°03.0	5°03.8	4°49.2	1.2 - 0.4	7.2 - 2.5	13.2 - 4.5
13	5°03.2	5°04.1	4°49.4	1.3 - 0.4	7.3 - 2.5	13.3 - 4.5
14	5°03.5	5°04.3	4°49.7	1.4 - 0.5	7.4 - 2.5	13.4 - 4.6
15	5°03.8	5°04.6	4°49.9	1.5 - 0.5	7.5 - 2.6	13.5 - 4.6
16	5°04.0	5°04.8	4°50.2	1.6 - 0.5	7.6 - 2.6	13.6 - 4.6
17	5°04.3	5°05.1	4°50.4	1.7 - 0.6	7.7 - 2.6	13.7 - 4.7
18	5°04.5	5°05.3	4°50.6	1.8 - 0.6	7.8 - 2.7	13.8 - 4.7
19	5°04.7	5°05.6	4°50.9	1.9 - 0.6	7.9 - 2.7	13.9 - 4.7
20	5°05.0	5°05.8	4°51.1	2.0 - 0.7	8.0 - 2.7	14.0 - 4.8
21	5°05.3	5°06.1	4°51.3	2.1 - 0.7	8.1 - 2.8	14.1 - 4.8
22	5°05.5	5°06.3	4°51.6	2.2 - 0.8	8.2 - 2.8	14.2 - 4.9
23	5°05.7	5°06.6	4°51.8	2.3 - 0.8	8.3 - 2.8	14.3 - 4.9
24	5°06.0	5°06.8	4°52.1	2.4 - 0.8	8.4 - 2.9	14.4 - 4.9
25	5°06.3	5°07.1	4°52.3	2.5 - 0.9	8.5 - 2.9	14.5 - 5.0
26	5°06.5	5°07.3	4°52.5	2.6 - 0.9	8.6 - 2.9	14.6 - 5.0
27	5°06.7	5°07.6	4°52.8	2.7 - 0.9	8.7 - 3.0	14.7 - 5.0
28	5°07.0	5°07.8	4°53.0	2.8 - 1.0	8.8 - 3.0	14.8 - 5.1
29	5°07.3	5°08.1	4°53.3	2.9 - 1.0	8.9 - 3.0	14.9 - 5.1
30	5°07.5	5°08.3	4°53.5	3.0 - 1.0	9.0 - 3.1	15.0 - 5.1
31	5°07.7	5°08.6	4°53.7	3.1 - 1.1	9.1 - 3.1	15.1 - 5.2
32	5°08.0	5°08.8	4°54.0	3.2 - 1.1	9.2 - 3.1	15.2 - 5.2
33	5°08.3	5°09.1	4°54.2	3.3 - 1.1	9.3 - 3.2	15.3 - 5.2
34	5°08.5	5°09.3	4°54.4	3.4 - 1.2	9.4 - 3.2	15.4 - 5.3
35	5°08.7	5°09.6	4°54.7	3.5 - 1.2	9.5 - 3.2	15.5 - 5.3
36	5°09.0	5°09.8	4°54.9	3.6 - 1.2	9.6 - 3.3	15.6 - 5.3
37	5°09.3	5°10.1	4°55.2	3.7 - 1.3	9.7 - 3.3	15.7 - 5.4
38	5°09.5	5°10.3	4°55.4	3.8 - 1.3	9.8 - 3.3	15.8 - 5.4
39	5°09.7	5°10.6	4°55.6	3.9 - 1.3	9.9 - 3.4	15.9 - 5.4
40	5°10.0	5°10.8	4°55.9	4.0 - 1.4	10.0 - 3.4	16.0 - 5.5
41	5°10.3	5°11.1	4°56.1	4.1 - 1.4	10.1 - 3.5	16.1 - 5.5
42	5°10.5	5°11.3	4°56.4	4.2 - 1.4	10.2 - 3.5	16.2 - 5.5
43	5°10.7	5°11.6	4°56.6	4.3 - 1.5	10.3 - 3.5	16.3 - 5.6
44	5°11.0	5°11.9	4°56.8	4.4 - 1.5	10.4 - 3.6	16.4 - 5.6
45	5°11.2	5°12.1	4°57.1	4.5 - 1.5	10.5 - 3.6	16.5 - 5.6
46	5°11.5	5°12.4	4°57.3	4.6 - 1.6	10.6 - 3.6	16.6 - 5.7
47	5°11.8	5°12.6	4°57.5	4.7 - 1.6	10.7 - 3.7	16.7 - 5.7
48	5°12.0	5°12.9	4°57.8	4.8 - 1.6	10.8 - 3.7	16.8 - 5.7
49	5°12.2	5°13.1	4°58.0	4.9 - 1.7	10.9 - 3.7	16.9 - 5.8
50	5°12.5	5°13.4	4°58.3	5.0 - 1.7	11.0 - 3.8	17.0 - 5.8
51	5°12.8	5°13.6	4°58.5	5.1 - 1.7	11.1 - 3.8	17.1 - 5.8
52	5°13.0	5°13.9	4°58.7	5.2 - 1.8	11.2 - 3.8	17.2 - 5.9
53	5°13.2	5°14.1	4°59.0	5.3 - 1.8	11.3 - 3.9	17.3 - 5.9
54	5°13.5	5°14.4	4°59.2	5.4 - 1.8	11.4 - 3.9	17.4 - 5.9
55	5°13.8	5°14.6	4°59.5	5.5 - 1.9	11.5 - 3.9	17.5 - 6.0
56	5°14.0	5°14.9	4°59.7	5.6 - 1.9	11.6 - 4.0	17.6 - 6.0
57	5°14.2	5°15.1	4°59.9	5.7 - 1.9	11.7 - 4.0	17.7 - 6.0
58	5°14.5	5°15.4	5°00.2	5.8 - 2.0	11.8 - 4.0	17.8 - 6.1
59	5°14.8	5°15.6	5°00.4	5.9 - 2.0	11.9 - 4.1	17.9 - 6.1

Increments and Corrections

m 21	Sun Plan.	Aries	Moon	v and d corr		
0	5°15.0	5°15.9	5°00.6	0.0 - 0.0	6.0 - 2.2	12.0 - 4.3
1	5°15.2	5°16.1	5°00.9	0.1 - 0.0	6.1 - 2.2	12.1 - 4.3
2	5°15.5	5°16.4	5°01.1	0.2 - 0.1	6.2 - 2.2	12.2 - 4.4
3	5°15.8	5°16.6	5°01.4	0.3 - 0.1	6.3 - 2.3	12.3 - 4.4
4	5°16.0	5°16.9	5°01.6	0.4 - 0.1	6.4 - 2.3	12.4 - 4.4
5	5°16.2	5°17.1	5°01.8	0.5 - 0.2	6.5 - 2.3	12.5 - 4.5
6	5°16.5	5°17.4	5°02.1	0.6 - 0.2	6.6 - 2.4	12.6 - 4.5
7	5°16.8	5°17.6	5°02.3	0.7 - 0.3	6.7 - 2.4	12.7 - 4.6
8	5°17.0	5°17.9	5°02.6	0.8 - 0.3	6.8 - 2.4	12.8 - 4.6
9	5°17.2	5°18.1	5°02.8	0.9 - 0.3	6.9 - 2.5	12.9 - 4.6
10	5°17.5	5°18.4	5°03.0	1.0 - 0.4	7.0 - 2.5	13.0 - 4.7
11	5°17.8	5°18.6	5°03.3	1.1 - 0.4	7.1 - 2.5	13.1 - 4.7
12	5°18.0	5°18.9	5°03.5	1.2 - 0.4	7.2 - 2.6	13.2 - 4.7
13	5°18.2	5°19.1	5°03.8	1.3 - 0.5	7.3 - 2.6	13.3 - 4.8
14	5°18.5	5°19.4	5°04.0	1.4 - 0.5	7.4 - 2.7	13.4 - 4.8
15	5°18.8	5°19.6	5°04.2	1.5 - 0.5	7.5 - 2.7	13.5 - 4.8
16	5°19.0	5°19.9	5°04.5	1.6 - 0.6	7.6 - 2.7	13.6 - 4.9
17	5°19.3	5°20.1	5°04.7	1.7 - 0.6	7.7 - 2.8	13.7 - 4.9
18	5°19.5	5°20.4	5°04.9	1.8 - 0.6	7.8 - 2.8	13.8 - 4.9
19	5°19.7	5°20.6	5°05.2	1.9 - 0.7	7.9 - 2.8	13.9 - 5.0
20	5°20.0	5°20.9	5°05.4	2.0 - 0.7	8.0 - 2.9	14.0 - 5.0
21	5°20.3	5°21.1	5°05.7	2.1 - 0.8	8.1 - 2.9	14.1 - 5.1
22	5°20.5	5°21.4	5°05.9	2.2 - 0.8	8.2 - 2.9	14.2 - 5.1
23	5°20.7	5°21.6	5°06.1	2.3 - 0.8	8.3 - 3.0	14.3 - 5.1
24	5°21.0	5°21.9	5°06.4	2.4 - 0.9	8.4 - 3.0	14.4 - 5.2
25	5°21.3	5°22.1	5°06.6	2.5 - 0.9	8.5 - 3.0	14.5 - 5.2
26	5°21.5	5°22.4	5°06.9	2.6 - 0.9	8.6 - 3.1	14.6 - 5.2
27	5°21.7	5°22.6	5°07.1	2.7 - 1.0	8.7 - 3.1	14.7 - 5.3
28	5°22.0	5°22.9	5°07.3	2.8 - 1.0	8.8 - 3.2	14.8 - 5.3
29	5°22.3	5°23.1	5°07.6	2.9 - 1.0	8.9 - 3.2	14.9 - 5.3
30	5°22.5	5°23.4	5°07.8	3.0 - 1.1	9.0 - 3.2	15.0 - 5.4
31	5°22.7	5°23.6	5°08.0	3.1 - 1.1	9.1 - 3.3	15.1 - 5.4
32	5°23.0	5°23.9	5°08.3	3.2 - 1.1	9.2 - 3.3	15.2 - 5.4
33	5°23.3	5°24.1	5°08.5	3.3 - 1.2	9.3 - 3.3	15.3 - 5.5
34	5°23.5	5°24.4	5°08.8	3.4 - 1.2	9.4 - 3.4	15.4 - 5.5
35	5°23.7	5°24.6	5°09.0	3.5 - 1.3	9.5 - 3.4	15.5 - 5.6
36	5°24.0	5°24.9	5°09.2	3.6 - 1.3	9.6 - 3.4	15.6 - 5.6
37	5°24.3	5°25.1	5°09.5	3.7 - 1.3	9.7 - 3.5	15.7 - 5.6
38	5°24.5	5°25.4	5°09.7	3.8 - 1.4	9.8 - 3.5	15.8 - 5.7
39	5°24.7	5°25.6	5°10.0	3.9 - 1.4	9.9 - 3.5	15.9 - 5.7
40	5°25.0	5°25.9	5°10.2	4.0 - 1.4	10.0 - 3.6	16.0 - 5.7
41	5°25.3	5°26.1	5°10.4	4.1 - 1.5	10.1 - 3.6	16.1 - 5.8
42	5°25.5	5°26.4	5°10.7	4.2 - 1.5	10.2 - 3.7	16.2 - 5.8
43	5°25.7	5°26.6	5°10.9	4.3 - 1.5	10.3 - 3.7	16.3 - 5.8
44	5°26.0	5°26.9	5°11.1	4.4 - 1.6	10.4 - 3.7	16.4 - 5.9
45	5°26.2	5°27.1	5°11.4	4.5 - 1.6	10.5 - 3.8	16.5 - 5.9
46	5°26.5	5°27.4	5°11.6	4.6 - 1.6	10.6 - 3.8	16.6 - 5.9
47	5°26.8	5°27.6	5°11.9	4.7 - 1.7	10.7 - 3.8	16.7 - 6.0
48	5°27.0	5°27.9	5°12.1	4.8 - 1.7	10.8 - 3.9	16.8 - 6.0
49	5°27.2	5°28.1	5°12.3	4.9 - 1.8	10.9 - 3.9	16.9 - 6.1
50	5°27.5	5°28.4	5°12.6	5.0 - 1.8	11.0 - 3.9	17.0 - 6.1
51	5°27.8	5°28.6	5°12.8	5.1 - 1.8	11.1 - 4.0	17.1 - 6.1
52	5°28.0	5°28.9	5°13.1	5.2 - 1.9	11.2 - 4.0	17.2 - 6.2
53	5°28.2	5°29.1	5°13.3	5.3 - 1.9	11.3 - 4.0	17.3 - 6.2
54	5°28.5	5°29.4	5°13.5	5.4 - 1.9	11.4 - 4.1	17.4 - 6.2
55	5°28.8	5°29.6	5°13.8	5.5 - 2.0	11.5 - 4.1	17.5 - 6.3
56	5°29.0	5°29.9	5°14.0	5.6 - 2.0	11.6 - 4.2	17.6 - 6.3
57	5°29.2	5°30.1	5°14.3	5.7 - 2.0	11.7 - 4.2	17.7 - 6.3
58	5°29.5	5°30.4	5°14.5	5.8 - 2.1	11.8 - 4.2	17.8 - 6.4
59	5°29.8	5°30.7	5°14.7	5.9 - 2.1	11.9 - 4.3	17.9 - 6.4

m 22	Sun Plan.	Aries	Moon	v and d corr		
0	5°30.0	5°30.9	5°15.0	0.0 - 0.0	6.0 - 2.3	12.0 - 4.5
1	5°30.2	5°31.2	5°15.2	0.1 - 0.0	6.1 - 2.3	12.1 - 4.5
2	5°30.5	5°31.4	5°15.4	0.2 - 0.1	6.2 - 2.3	12.2 - 4.6
3	5°30.8	5°31.7	5°15.7	0.3 - 0.1	6.3 - 2.4	12.3 - 4.6
4	5°31.0	5°31.9	5°15.9	0.4 - 0.2	6.4 - 2.4	12.4 - 4.7
5	5°31.2	5°32.2	5°16.2	0.5 - 0.2	6.5 - 2.4	12.5 - 4.7
6	5°31.5	5°32.4	5°16.4	0.6 - 0.2	6.6 - 2.5	12.6 - 4.7
7	5°31.8	5°32.7	5°16.6	0.7 - 0.3	6.7 - 2.5	12.7 - 4.8
8	5°32.0	5°32.9	5°16.9	0.8 - 0.3	6.8 - 2.6	12.8 - 4.8
9	5°32.2	5°33.2	5°17.1	0.9 - 0.3	6.9 - 2.6	12.9 - 4.8
10	5°32.5	5°33.4	5°17.4	1.0 - 0.4	7.0 - 2.6	13.0 - 4.9
11	5°32.8	5°33.7	5°17.6	1.1 - 0.4	7.1 - 2.7	13.1 - 4.9
12	5°33.0	5°33.9	5°17.8	1.2 - 0.5	7.2 - 2.7	13.2 - 4.9
13	5°33.2	5°34.2	5°18.1	1.3 - 0.5	7.3 - 2.7	13.3 - 5.0
14	5°33.5	5°34.4	5°18.3	1.4 - 0.5	7.4 - 2.8	13.4 - 5.0
15	5°33.8	5°34.7	5°18.5	1.5 - 0.6	7.5 - 2.8	13.5 - 5.1
16	5°34.0	5°34.9	5°18.8	1.6 - 0.6	7.6 - 2.8	13.6 - 5.1
17	5°34.3	5°35.2	5°19.0	1.7 - 0.6	7.7 - 2.9	13.7 - 5.1
18	5°34.5	5°35.4	5°19.3	1.8 - 0.7	7.8 - 2.9	13.8 - 5.2
19	5°34.8	5°35.7	5°19.5	1.9 - 0.7	7.9 - 3.0	13.9 - 5.2
20	5°35.0	5°35.9	5°19.7	2.0 - 0.8	8.0 - 3.0	14.0 - 5.3
21	5°35.3	5°36.2	5°20.0	2.1 - 0.8	8.1 - 3.0	14.1 - 5.3
22	5°35.5	5°36.4	5°20.2	2.2 - 0.8	8.2 - 3.1	14.2 - 5.3
23	5°35.7	5°36.7	5°20.5	2.3 - 0.9	8.3 - 3.1	14.3 - 5.4
24	5°36.0	5°36.9	5°20.7	2.4 - 0.9	8.4 - 3.2	14.4 - 5.4
25	5°36.3	5°37.2	5°20.9	2.5 - 0.9	8.5 - 3.2	14.5 - 5.4
26	5°36.5	5°37.4	5°21.2	2.6 - 1.0	8.6 - 3.2	14.6 - 5.5
27	5°36.7	5°37.7	5°21.4	2.7 - 1.0	8.7 - 3.3	14.7 - 5.5
28	5°37.0	5°37.9	5°21.6	2.8 - 1.1	8.8 - 3.3	14.8 - 5.6
29	5°37.3	5°38.2	5°21.9	2.9 - 1.1	8.9 - 3.3	14.9 - 5.6
30	5°37.5	5°38.4	5°22.1	3.0 - 1.1	9.0 - 3.4	15.0 - 5.6
31	5°37.7	5°38.7	5°22.4	3.1 - 1.2	9.1 - 3.4	15.1 - 5.7
32	5°38.0	5°38.9	5°22.6	3.2 - 1.2	9.2 - 3.5	15.2 - 5.7
33	5°38.3	5°39.2	5°22.8	3.3 - 1.2	9.3 - 3.5	15.3 - 5.7
34	5°38.5	5°39.4	5°23.1	3.4 - 1.3	9.4 - 3.5	15.4 - 5.8
35	5°38.7	5°39.7	5°23.3	3.5 - 1.3	9.5 - 3.6	15.5 - 5.8
36	5°39.0	5°39.9	5°23.6	3.6 - 1.4	9.6 - 3.6	15.6 - 5.9
37	5°39.3	5°40.2	5°23.8	3.7 - 1.4	9.7 - 3.6	15.7 - 5.9
38	5°39.5	5°40.4	5°24.0	3.8 - 1.4	9.8 - 3.7	15.8 - 5.9
39	5°39.7	5°40.7	5°24.3	3.9 - 1.5	9.9 - 3.7	15.9 - 6.0
40	5°40.0	5°40.9	5°24.5	4.0 - 1.5	10.0 - 3.8	16.0 - 6.0
41	5°40.2	5°41.2	5°24.7	4.1 - 1.5	10.1 - 3.8	16.1 - 6.0
42	5°40.5	5°41.4	5°25.0	4.2 - 1.6	10.2 - 3.8	16.2 - 6.1
43	5°40.7	5°41.7	5°25.2	4.3 - 1.6	10.3 - 3.9	16.3 - 6.1
44	5°41.0	5°41.9	5°25.5	4.4 - 1.7	10.4 - 3.9	16.4 - 6.1
45	5°41.2	5°42.2	5°25.7	4.5 - 1.7	10.5 - 3.9	16.5 - 6.2
46	5°41.5	5°42.4	5°25.9	4.6 - 1.7	10.6 - 4.0	16.6 - 6.2
47	5°41.8	5°42.7	5°26.2	4.7 - 1.8	10.7 - 4.0	16.7 - 6.3
48	5°42.0	5°42.9	5°26.4	4.8 - 1.8	10.8 - 4.1	16.8 - 6.3
49	5°42.2	5°43.2	5°26.7	4.9 - 1.8	10.9 - 4.1	16.9 - 6.3
50	5°42.5	5°43.4	5°26.9	5.0 - 1.9	11.0 - 4.1	17.0 - 6.4
51	5°42.8	5°43.7	5°27.1	5.1 - 1.9	11.1 - 4.2	17.1 - 6.4
52	5°43.0	5°43.9	5°27.4	5.2 - 2.0	11.2 - 4.2	17.2 - 6.5
53	5°43.2	5°44.2	5°27.6	5.3 - 2.0	11.3 - 4.2	17.3 - 6.5
54	5°43.5	5°44.4	5°27.9	5.4 - 2.0	11.4 - 4.3	17.4 - 6.5
55	5°43.8	5°44.7	5°28.1	5.5 - 2.1	11.5 - 4.3	17.5 - 6.6
56	5°44.0	5°44.9	5°28.3	5.6 - 2.1	11.6 - 4.4	17.6 - 6.6
57	5°44.2	5°45.2	5°28.6	5.7 - 2.1	11.7 - 4.4	17.7 - 6.6
58	5°44.5	5°45.4	5°28.8	5.8 - 2.2	11.8 - 4.4	17.8 - 6.7
59	5°44.8	5°45.7	5°29.0	5.9 - 2.2	11.9 - 4.5	17.9 - 6.7

m 23	Sun Plan.	Aries	Moon	v and d corr		
0	5°45.0	5°45.9	5°29.3	0.0 - 0.0	6.0 - 2.4	12.0 - 4.7
1	5°45.2	5°46.2	5°29.5	0.1 - 0.0	6.1 - 2.4	12.1 - 4.7
2	5°45.5	5°46.4	5°29.8	0.2 - 0.1	6.2 - 2.4	12.2 - 4.8
3	5°45.8	5°46.7	5°30.0	0.3 - 0.1	6.3 - 2.5	12.3 - 4.8
4	5°46.0	5°46.9	5°30.2	0.4 - 0.2	6.4 - 2.5	12.4 - 4.9
5	5°46.2	5°47.2	5°30.5	0.5 - 0.2	6.5 - 2.5	12.5 - 4.9
6	5°46.5	5°47.4	5°30.7	0.6 - 0.2	6.6 - 2.6	12.6 - 4.9
7	5°46.8	5°47.7	5°31.0	0.7 - 0.3	6.7 - 2.6	12.7 - 5.0
8	5°47.0	5°47.9	5°31.2	0.8 - 0.3	6.8 - 2.7	12.8 - 5.0
9	5°47.2	5°48.2	5°31.4	0.9 - 0.4	6.9 - 2.7	12.9 - 5.1
10	5°47.5	5°48.4	5°31.7	1.0 - 0.4	7.0 - 2.7	13.0 - 5.1
11	5°47.8	5°48.7	5°31.9	1.1 - 0.4	7.1 - 2.8	13.1 - 5.1
12	5°48.0	5°49.0	5°32.1	1.2 - 0.5	7.2 - 2.8	13.2 - 5.2
13	5°48.2	5°49.2	5°32.4	1.3 - 0.5	7.3 - 2.9	13.3 - 5.2
14	5°48.5	5°49.5	5°32.6	1.4 - 0.5	7.4 - 2.9	13.4 - 5.2
15	5°48.8	5°49.7	5°32.9	1.5 - 0.6	7.5 - 2.9	13.5 - 5.3
16	5°49.0	5°50.0	5°33.1	1.6 - 0.6	7.6 - 3.0	13.6 - 5.3
17	5°49.3	5°50.2	5°33.3	1.7 - 0.7	7.7 - 3.0	13.7 - 5.4
18	5°49.5	5°50.5	5°33.6	1.8 - 0.7	7.8 - 3.1	13.8 - 5.4
19	5°49.8	5°50.7	5°33.8	1.9 - 0.7	7.9 - 3.1	13.9 - 5.4
20	5°50.0	5°51.0	5°34.1	2.0 - 0.8	8.0 - 3.1	14.0 - 5.5
21	5°50.3	5°51.2	5°34.3	2.1 - 0.8	8.1 - 3.2	14.1 - 5.5
22	5°50.5	5°51.5	5°34.5	2.2 - 0.9	8.2 - 3.2	14.2 - 5.6
23	5°50.7	5°51.7	5°34.8	2.3 - 0.9	8.3 - 3.3	14.3 - 5.6
24	5°51.0	5°52.0	5°35.0	2.4 - 0.9	8.4 - 3.3	14.4 - 5.6
25	5°51.3	5°52.2	5°35.2	2.5 - 1.0	8.5 - 3.3	14.5 - 5.7
26	5°51.5	5°52.5	5°35.5	2.6 - 1.0	8.6 - 3.4	14.6 - 5.7
27	5°51.7	5°52.7	5°35.7	2.7 - 1.1	8.7 - 3.4	14.7 - 5.8
28	5°52.0	5°53.0	5°36.0	2.8 - 1.1	8.8 - 3.4	14.8 - 5.8
29	5°52.3	5°53.2	5°36.2	2.9 - 1.1	8.9 - 3.5	14.9 - 5.8
30	5°52.5	5°53.5	5°36.4	3.0 - 1.2	9.0 - 3.5	15.0 - 5.9
31	5°52.7	5°53.7	5°36.7	3.1 - 1.2	9.1 - 3.6	15.1 - 5.9
32	5°53.0	5°54.0	5°36.9	3.2 - 1.3	9.2 - 3.6	15.2 - 6.0
33	5°53.3	5°54.2	5°37.2	3.3 - 1.3	9.3 - 3.6	15.3 - 6.0
34	5°53.5	5°54.5	5°37.4	3.4 - 1.3	9.4 - 3.7	15.4 - 6.0
35	5°53.7	5°54.7	5°37.6	3.5 - 1.4	9.5 - 3.7	15.5 - 6.1
36	5°54.0	5°55.0	5°37.9	3.6 - 1.4	9.6 - 3.8	15.6 - 6.1
37	5°54.3	5°55.2	5°38.1	3.7 - 1.4	9.7 - 3.8	15.7 - 6.1
38	5°54.5	5°55.5	5°38.4	3.8 - 1.5	9.8 - 3.8	15.8 - 6.2
39	5°54.7	5°55.7	5°38.6	3.9 - 1.5	9.9 - 3.9	15.9 - 6.2
40	5°55.0	5°56.0	5°38.8	4.0 - 1.6	10.0 - 3.9	16.0 - 6.3
41	5°55.2	5°56.2	5°39.1	4.1 - 1.6	10.1 - 4.0	16.1 - 6.3
42	5°55.5	5°56.5	5°39.3	4.2 - 1.6	10.2 - 4.0	16.2 - 6.3
43	5°55.7	5°56.7	5°39.5	4.3 - 1.7	10.3 - 4.0	16.3 - 6.4
44	5°56.0	5°57.0	5°39.8	4.4 - 1.7	10.4 - 4.1	16.4 - 6.4
45	5°56.2	5°57.2	5°40.0	4.5 - 1.8	10.5 - 4.1	16.5 - 6.5
46	5°56.5	5°57.5	5°40.3	4.6 - 1.8	10.6 - 4.2	16.6 - 6.5
47	5°56.8	5°57.7	5°40.5	4.7 - 1.8	10.7 - 4.2	16.7 - 6.5
48	5°57.0	5°58.0	5°40.7	4.8 - 1.9	10.8 - 4.2	16.8 - 6.6
49	5°57.2	5°58.2	5°41.0	4.9 - 1.9	10.9 - 4.3	16.9 - 6.6
50	5°57.5	5°58.5	5°41.2	5.0 - 2.0	11.0 - 4.3	17.0 - 6.7
51	5°57.8	5°58.7	5°41.5	5.1 - 2.0	11.1 - 4.3	17.1 - 6.7
52	5°58.0	5°59.0	5°41.7	5.2 - 2.0	11.2 - 4.4	17.2 - 6.7
53	5°58.2	5°59.2	5°41.9	5.3 - 2.1	11.3 - 4.4	17.3 - 6.8
54	5°58.5	5°59.5	5°42.2	5.4 - 2.1	11.4 - 4.5	17.4 - 6.8
55	5°58.8	5°59.7	5°42.4	5.5 - 2.2	11.5 - 4.5	17.5 - 6.9
56	5°59.0	5°60.0	5°42.6	5.6 - 2.2	11.6 - 4.5	17.6 - 6.9
57	5°59.2	6°00.2	5°42.9	5.7 - 2.2	11.7 - 4.6	17.7 - 6.9
58	5°59.5	6°00.5	5°43.1	5.8 - 2.3	11.8 - 4.6	17.8 - 7.0
59	5°59.8	6°00.7	5°43.4	5.9 - 2.3	11.9 - 4.7	17.9 - 7.0

Increments and Corrections

m 24	Sun Plan.	Aries	Moon	v and d corr		
0	6°00.0	6°01.0	5°43.6	0.0 - 0.0	6.0 - 2.5	12.0 - 4.9
1	6°00.2	6°01.2	5°43.8	0.1 - 0.0	6.1 - 2.5	12.1 - 4.9
2	6°00.5	6°01.5	5°44.1	0.2 - 0.1	6.2 - 2.5	12.2 - 5.0
3	6°00.8	6°01.7	5°44.3	0.3 - 0.1	6.3 - 2.6	12.3 - 5.0
4	6°01.0	6°02.0	5°44.6	0.4 - 0.2	6.4 - 2.6	12.4 - 5.1
5	6°01.2	6°02.2	5°44.8	0.5 - 0.2	6.5 - 2.7	12.5 - 5.1
6	6°01.5	6°02.5	5°45.0	0.6 - 0.2	6.6 - 2.7	12.6 - 5.1
7	6°01.8	6°02.7	5°45.3	0.7 - 0.3	6.7 - 2.7	12.7 - 5.2
8	6°02.0	6°03.0	5°45.5	0.8 - 0.3	6.8 - 2.8	12.8 - 5.2
9	6°02.2	6°03.2	5°45.7	0.9 - 0.4	6.9 - 2.8	12.9 - 5.3
10	6°02.5	6°03.5	5°46.0	1.0 - 0.4	7.0 - 2.9	13.0 - 5.3
11	6°02.8	6°03.7	5°46.2	1.1 - 0.4	7.1 - 2.9	13.1 - 5.3
12	6°03.0	6°04.0	5°46.5	1.2 - 0.5	7.2 - 2.9	13.2 - 5.4
13	6°03.2	6°04.2	5°46.7	1.3 - 0.5	7.3 - 3.0	13.3 - 5.4
14	6°03.5	6°04.5	5°46.9	1.4 - 0.6	7.4 - 3.0	13.4 - 5.5
15	6°03.8	6°04.7	5°47.2	1.5 - 0.6	7.5 - 3.1	13.5 - 5.5
16	6°04.0	6°05.0	5°47.4	1.6 - 0.7	7.6 - 3.1	13.6 - 5.6
17	6°04.3	6°05.2	5°47.7	1.7 - 0.7	7.7 - 3.1	13.7 - 5.6
18	6°04.5	6°05.5	5°47.9	1.8 - 0.7	7.8 - 3.2	13.8 - 5.6
19	6°04.7	6°05.7	5°48.1	1.9 - 0.8	7.9 - 3.2	13.9 - 5.7
20	6°05.0	6°06.0	5°48.4	2.0 - 0.8	8.0 - 3.3	14.0 - 5.7
21	6°05.3	6°06.2	5°48.6	2.1 - 0.9	8.1 - 3.3	14.1 - 5.8
22	6°05.5	6°06.5	5°48.8	2.2 - 0.9	8.2 - 3.3	14.2 - 5.8
23	6°05.7	6°06.7	5°49.1	2.3 - 0.9	8.3 - 3.4	14.3 - 5.8
24	6°06.0	6°07.0	5°49.3	2.4 - 1.0	8.4 - 3.4	14.4 - 5.9
25	6°06.3	6°07.3	5°49.6	2.5 - 1.0	8.5 - 3.5	14.5 - 5.9
26	6°06.5	6°07.5	5°49.8	2.6 - 1.1	8.6 - 3.5	14.6 - 6.0
27	6°06.7	6°07.8	5°50.0	2.7 - 1.1	8.7 - 3.6	14.7 - 6.0
28	6°07.0	6°08.0	5°50.3	2.8 - 1.1	8.8 - 3.6	14.8 - 6.0
29	6°07.3	6°08.3	5°50.5	2.9 - 1.2	8.9 - 3.6	14.9 - 6.1
30	6°07.5	6°08.5	5°50.8	3.0 - 1.2	9.0 - 3.7	15.0 - 6.1
31	6°07.7	6°08.8	5°51.0	3.1 - 1.3	9.1 - 3.7	15.1 - 6.2
32	6°08.0	6°09.0	5°51.2	3.2 - 1.3	9.2 - 3.8	15.2 - 6.2
33	6°08.3	6°09.3	5°51.5	3.3 - 1.3	9.3 - 3.8	15.3 - 6.2
34	6°08.5	6°09.5	5°51.7	3.4 - 1.4	9.4 - 3.8	15.4 - 6.3
35	6°08.7	6°09.8	5°52.0	3.5 - 1.4	9.5 - 3.9	15.5 - 6.3
36	6°09.0	6°10.0	5°52.2	3.6 - 1.5	9.6 - 3.9	15.6 - 6.4
37	6°09.3	6°10.3	5°52.4	3.7 - 1.5	9.7 - 4.0	15.7 - 6.4
38	6°09.5	6°10.5	5°52.7	3.8 - 1.6	9.8 - 4.0	15.8 - 6.5
39	6°09.7	6°10.8	5°52.9	3.9 - 1.6	9.9 - 4.0	15.9 - 6.5
40	6°10.0	6°11.0	5°53.1	4.0 - 1.6	10.0 - 4.1	16.0 - 6.5
41	6°10.3	6°11.3	5°53.4	4.1 - 1.7	10.1 - 4.1	16.1 - 6.6
42	6°10.5	6°11.5	5°53.6	4.2 - 1.7	10.2 - 4.2	16.2 - 6.6
43	6°10.7	6°11.8	5°53.9	4.3 - 1.8	10.3 - 4.2	16.3 - 6.7
44	6°11.0	6°12.0	5°54.1	4.4 - 1.8	10.4 - 4.2	16.4 - 6.7
45	6°11.2	6°12.3	5°54.3	4.5 - 1.8	10.5 - 4.3	16.5 - 6.7
46	6°11.5	6°12.5	5°54.6	4.6 - 1.9	10.6 - 4.3	16.6 - 6.8
47	6°11.8	6°12.8	5°54.8	4.7 - 1.9	10.7 - 4.4	16.7 - 6.8
48	6°12.0	6°13.0	5°55.1	4.8 - 2.0	10.8 - 4.4	16.8 - 6.9
49	6°12.2	6°13.3	5°55.3	4.9 - 2.0	10.9 - 4.5	16.9 - 6.9
50	6°12.5	6°13.5	5°55.5	5.0 - 2.0	11.0 - 4.5	17.0 - 6.9
51	6°12.8	6°13.8	5°55.8	5.1 - 2.1	11.1 - 4.5	17.1 - 7.0
52	6°13.0	6°14.0	5°56.0	5.2 - 2.1	11.2 - 4.6	17.2 - 7.0
53	6°13.2	6°14.3	5°56.2	5.3 - 2.2	11.3 - 4.6	17.3 - 7.1
54	6°13.5	6°14.5	5°56.5	5.4 - 2.2	11.4 - 4.7	17.4 - 7.1
55	6°13.8	6°14.8	5°56.7	5.5 - 2.2	11.5 - 4.7	17.5 - 7.1
56	6°14.0	6°15.0	5°57.0	5.6 - 2.3	11.6 - 4.7	17.6 - 7.2
57	6°14.2	6°15.3	5°57.2	5.7 - 2.3	11.7 - 4.8	17.7 - 7.2
58	6°14.5	6°15.5	5°57.4	5.8 - 2.4	11.8 - 4.8	17.8 - 7.3
59	6°14.8	6°15.8	5°57.7	5.9 - 2.4	11.9 - 4.9	17.9 - 7.3

m 25	Sun Plan.	Aries	Moon	v and d corr		
0	6°15.0	6°16.0	5°57.9	0.0 - 0.0	6.0 - 2.6	12.0 - 5.1
1	6°15.2	6°16.3	5°58.2	0.1 - 0.0	6.1 - 2.6	12.1 - 5.1
2	6°15.5	6°16.5	5°58.4	0.2 - 0.1	6.2 - 2.6	12.2 - 5.2
3	6°15.8	6°16.8	5°58.6	0.3 - 0.1	6.3 - 2.7	12.3 - 5.2
4	6°16.0	6°17.0	5°58.9	0.4 - 0.2	6.4 - 2.7	12.4 - 5.3
5	6°16.2	6°17.3	5°59.1	0.5 - 0.2	6.5 - 2.8	12.5 - 5.3
6	6°16.5	6°17.5	5°59.3	0.6 - 0.3	6.6 - 2.8	12.6 - 5.4
7	6°16.8	6°17.8	5°59.6	0.7 - 0.3	6.7 - 2.8	12.7 - 5.4
8	6°17.0	6°18.0	5°59.8	0.8 - 0.3	6.8 - 2.9	12.8 - 5.4
9	6°17.2	6°18.3	6°00.1	0.9 - 0.4	6.9 - 2.9	12.9 - 5.5
10	6°17.5	6°18.5	6°00.3	1.0 - 0.4	7.0 - 3.0	13.0 - 5.5
11	6°17.8	6°18.8	6°00.5	1.1 - 0.5	7.1 - 3.0	13.1 - 5.6
12	6°18.0	6°19.0	6°00.8	1.2 - 0.5	7.2 - 3.1	13.2 - 5.6
13	6°18.2	6°19.3	6°01.0	1.3 - 0.6	7.3 - 3.1	13.3 - 5.7
14	6°18.5	6°19.5	6°01.3	1.4 - 0.6	7.4 - 3.1	13.4 - 5.7
15	6°18.8	6°19.8	6°01.5	1.5 - 0.6	7.5 - 3.2	13.5 - 5.7
16	6°19.0	6°20.0	6°01.7	1.6 - 0.7	7.6 - 3.2	13.6 - 5.8
17	6°19.3	6°20.3	6°02.0	1.7 - 0.7	7.7 - 3.3	13.7 - 5.8
18	6°19.5	6°20.5	6°02.2	1.8 - 0.8	7.8 - 3.3	13.8 - 5.9
19	6°19.7	6°20.8	6°02.5	1.9 - 0.8	7.9 - 3.4	13.9 - 5.9
20	6°20.0	6°21.0	6°02.7	2.0 - 0.9	8.0 - 3.4	14.0 - 6.0
21	6°20.3	6°21.3	6°02.9	2.1 - 0.9	8.1 - 3.4	14.1 - 6.0
22	6°20.5	6°21.5	6°03.2	2.2 - 0.9	8.2 - 3.5	14.2 - 6.0
23	6°20.7	6°21.8	6°03.4	2.3 - 1.0	8.3 - 3.5	14.3 - 6.1
24	6°21.0	6°22.0	6°03.6	2.4 - 1.0	8.4 - 3.6	14.4 - 6.1
25	6°21.3	6°22.3	6°03.9	2.5 - 1.1	8.5 - 3.6	14.5 - 6.2
26	6°21.5	6°22.5	6°04.1	2.6 - 1.1	8.6 - 3.7	14.6 - 6.2
27	6°21.7	6°22.8	6°04.4	2.7 - 1.1	8.7 - 3.7	14.7 - 6.2
28	6°22.0	6°23.0	6°04.6	2.8 - 1.2	8.8 - 3.7	14.8 - 6.3
29	6°22.3	6°23.3	6°04.8	2.9 - 1.2	8.9 - 3.8	14.9 - 6.3
30	6°22.5	6°23.5	6°05.1	3.0 - 1.3	9.0 - 3.8	15.0 - 6.4
31	6°22.7	6°23.8	6°05.3	3.1 - 1.3	9.1 - 3.9	15.1 - 6.4
32	6°23.0	6°24.0	6°05.6	3.2 - 1.4	9.2 - 3.9	15.2 - 6.5
33	6°23.3	6°24.3	6°05.8	3.3 - 1.4	9.3 - 4.0	15.3 - 6.5
34	6°23.5	6°24.5	6°06.0	3.4 - 1.4	9.4 - 4.0	15.4 - 6.5
35	6°23.7	6°24.8	6°06.3	3.5 - 1.5	9.5 - 4.0	15.5 - 6.6
36	6°24.0	6°25.0	6°06.5	3.6 - 1.5	9.6 - 4.1	15.6 - 6.6
37	6°24.3	6°25.3	6°06.7	3.7 - 1.6	9.7 - 4.1	15.7 - 6.7
38	6°24.5	6°25.6	6°07.0	3.8 - 1.6	9.8 - 4.2	15.8 - 6.7
39	6°24.7	6°25.8	6°07.2	3.9 - 1.7	9.9 - 4.2	15.9 - 6.8
40	6°25.0	6°26.1	6°07.5	4.0 - 1.7	10.0 - 4.3	16.0 - 6.8
41	6°25.3	6°26.3	6°07.7	4.1 - 1.7	10.1 - 4.3	16.1 - 6.8
42	6°25.5	6°26.6	6°07.9	4.2 - 1.8	10.2 - 4.3	16.2 - 6.9
43	6°25.7	6°26.8	6°08.2	4.3 - 1.8	10.3 - 4.4	16.3 - 6.9
44	6°26.0	6°27.1	6°08.4	4.4 - 1.9	10.4 - 4.4	16.4 - 7.0
45	6°26.2	6°27.3	6°08.7	4.5 - 1.9	10.5 - 4.5	16.5 - 7.0
46	6°26.5	6°27.6	6°08.9	4.6 - 2.0	10.6 - 4.5	16.6 - 7.1
47	6°26.8	6°27.8	6°09.1	4.7 - 2.0	10.7 - 4.5	16.7 - 7.1
48	6°27.0	6°28.1	6°09.4	4.8 - 2.0	10.8 - 4.6	16.8 - 7.1
49	6°27.2	6°28.3	6°09.6	4.9 - 2.1	10.9 - 4.6	16.9 - 7.2
50	6°27.5	6°28.6	6°09.8	5.0 - 2.1	11.0 - 4.7	17.0 - 7.2
51	6°27.8	6°28.8	6°10.1	5.1 - 2.2	11.1 - 4.7	17.1 - 7.3
52	6°28.0	6°29.1	6°10.3	5.2 - 2.2	11.2 - 4.8	17.2 - 7.3
53	6°28.2	6°29.3	6°10.6	5.3 - 2.3	11.3 - 4.8	17.3 - 7.4
54	6°28.5	6°29.6	6°10.8	5.4 - 2.3	11.4 - 4.8	17.4 - 7.4
55	6°28.8	6°29.8	6°11.0	5.5 - 2.3	11.5 - 4.9	17.5 - 7.4
56	6°29.0	6°30.1	6°11.3	5.6 - 2.4	11.6 - 4.9	17.6 - 7.5
57	6°29.2	6°30.3	6°11.5	5.7 - 2.4	11.7 - 5.0	17.7 - 7.5
58	6°29.5	6°30.6	6°11.8	5.8 - 2.5	11.8 - 5.0	17.8 - 7.6
59	6°29.8	6°30.8	6°12.0	5.9 - 2.5	11.9 - 5.1	17.9 - 7.6

m 26	Sun Plan.	Aries	Moon	v and d corr		
0	6°30.0	6°31.1	6°12.2	0.0 - 0.0	6.0 - 2.7	12.0 - 5.3
1	6°30.2	6°31.3	6°12.5	0.1 - 0.0	6.1 - 2.7	12.1 - 5.3
2	6°30.5	6°31.6	6°12.7	0.2 - 0.1	6.2 - 2.7	12.2 - 5.4
3	6°30.8	6°31.8	6°12.9	0.3 - 0.1	6.3 - 2.8	12.3 - 5.4
4	6°31.0	6°32.1	6°13.2	0.4 - 0.2	6.4 - 2.8	12.4 - 5.5
5	6°31.2	6°32.3	6°13.4	0.5 - 0.2	6.5 - 2.9	12.5 - 5.5
6	6°31.5	6°32.6	6°13.7	0.6 - 0.3	6.6 - 2.9	12.6 - 5.6
7	6°31.8	6°32.8	6°13.9	0.7 - 0.3	6.7 - 3.0	12.7 - 5.6
8	6°32.0	6°33.1	6°14.1	0.8 - 0.4	6.8 - 3.0	12.8 - 5.7
9	6°32.2	6°33.3	6°14.4	0.9 - 0.4	6.9 - 3.0	12.9 - 5.7
10	6°32.5	6°33.6	6°14.6	1.0 - 0.4	7.0 - 3.1	13.0 - 5.7
11	6°32.8	6°33.8	6°14.9	1.1 - 0.5	7.1 - 3.1	13.1 - 5.8
12	6°33.0	6°34.1	6°15.1	1.2 - 0.5	7.2 - 3.2	13.2 - 5.8
13	6°33.2	6°34.3	6°15.3	1.3 - 0.6	7.3 - 3.2	13.3 - 5.9
14	6°33.5	6°34.6	6°15.6	1.4 - 0.6	7.4 - 3.3	13.4 - 5.9
15	6°33.8	6°34.8	6°15.8	1.5 - 0.7	7.5 - 3.3	13.5 - 6.0
16	6°34.0	6°35.1	6°16.1	1.6 - 0.7	7.6 - 3.4	13.6 - 6.0
17	6°34.3	6°35.3	6°16.3	1.7 - 0.8	7.7 - 3.4	13.7 - 6.1
18	6°34.5	6°35.6	6°16.5	1.8 - 0.8	7.8 - 3.4	13.8 - 6.1
19	6°34.8	6°35.8	6°16.8	1.9 - 0.8	7.9 - 3.5	13.9 - 6.1
20	6°35.0	6°36.1	6°17.0	2.0 - 0.9	8.0 - 3.5	14.0 - 6.2
21	6°35.3	6°36.3	6°17.2	2.1 - 0.9	8.1 - 3.6	14.1 - 6.2
22	6°35.5	6°36.6	6°17.5	2.2 - 1.0	8.2 - 3.6	14.2 - 6.3
23	6°35.7	6°36.8	6°17.7	2.3 - 1.0	8.3 - 3.7	14.3 - 6.3
24	6°36.0	6°37.1	6°18.0	2.4 - 1.1	8.4 - 3.7	14.4 - 6.4
25	6°36.3	6°37.3	6°18.2	2.5 - 1.1	8.5 - 3.8	14.5 - 6.4
26	6°36.5	6°37.6	6°18.4	2.6 - 1.1	8.6 - 3.8	14.6 - 6.4
27	6°36.7	6°37.8	6°18.7	2.7 - 1.2	8.7 - 3.8	14.7 - 6.5
28	6°37.0	6°38.1	6°18.9	2.8 - 1.2	8.8 - 3.9	14.8 - 6.5
29	6°37.3	6°38.3	6°19.2	2.9 - 1.3	8.9 - 3.9	14.9 - 6.6
30	6°37.5	6°38.6	6°19.4	3.0 - 1.3	9.0 - 4.0	15.0 - 6.6
31	6°37.7	6°38.8	6°19.6	3.1 - 1.4	9.1 - 4.0	15.1 - 6.7
32	6°38.0	6°39.1	6°19.9	3.2 - 1.4	9.2 - 4.1	15.2 - 6.7
33	6°38.3	6°39.3	6°20.1	3.3 - 1.5	9.3 - 4.1	15.3 - 6.8
34	6°38.5	6°39.6	6°20.3	3.4 - 1.5	9.4 - 4.2	15.4 - 6.8
35	6°38.7	6°39.8	6°20.6	3.5 - 1.5	9.5 - 4.2	15.5 - 6.8
36	6°39.0	6°40.1	6°20.8	3.6 - 1.6	9.6 - 4.2	15.6 - 6.9
37	6°39.3	6°40.3	6°21.1	3.7 - 1.6	9.7 - 4.3	15.7 - 6.9
38	6°39.5	6°40.6	6°21.3	3.8 - 1.7	9.8 - 4.3	15.8 - 7.0
39	6°39.7	6°40.8	6°21.5	3.9 - 1.7	9.9 - 4.4	15.9 - 7.0
40	6°40.0	6°41.1	6°21.8	4.0 - 1.8	10.0 - 4.4	16.0 - 7.1
41	6°40.2	6°41.3	6°22.0	4.1 - 1.8	10.1 - 4.5	16.1 - 7.1
42	6°40.5	6°41.6	6°22.3	4.2 - 1.9	10.2 - 4.5	16.2 - 7.2
43	6°40.7	6°41.8	6°22.5	4.3 - 1.9	10.3 - 4.5	16.3 - 7.2
44	6°41.0	6°42.1	6°22.7	4.4 - 1.9	10.4 - 4.6	16.4 - 7.2
45	6°41.2	6°42.3	6°23.0	4.5 - 2.0	10.5 - 4.6	16.5 - 7.3
46	6°41.5	6°42.6	6°23.2	4.6 - 2.0	10.6 - 4.7	16.6 - 7.3
47	6°41.8	6°42.8	6°23.4	4.7 - 2.1	10.7 - 4.7	16.7 - 7.4
48	6°42.0	6°43.1	6°23.7	4.8 - 2.1	10.8 - 4.8	16.8 - 7.4
49	6°42.2	6°43.3	6°23.9	4.9 - 2.2	10.9 - 4.8	16.9 - 7.5
50	6°42.5	6°43.6	6°24.2	5.0 - 2.2	11.0 - 4.9	17.0 - 7.5
51	6°42.8	6°43.9	6°24.4	5.1 - 2.3	11.1 - 4.9	17.1 - 7.6
52	6°43.0	6°44.1	6°24.6	5.2 - 2.3	11.2 - 4.9	17.2 - 7.6
53	6°43.2	6°44.4	6°24.9	5.3 - 2.3	11.3 - 5.0	17.3 - 7.6
54	6°43.5	6°44.6	6°25.1	5.4 - 2.4	11.4 - 5.0	17.4 - 7.7
55	6°43.8	6°44.9	6°25.4	5.5 - 2.4	11.5 - 5.1	17.5 - 7.7
56	6°44.0	6°45.1	6°25.6	5.6 - 2.5	11.6 - 5.1	17.6 - 7.8
57	6°44.2	6°45.4	6°25.8	5.7 - 2.5	11.7 - 5.2	17.7 - 7.8
58	6°44.5	6°45.6	6°26.1	5.8 - 2.6	11.8 - 5.2	17.8 - 7.9
59	6°44.8	6°45.9	6°26.3	5.9 - 2.6	11.9 - 5.3	17.9 - 7.9

Increments and Corrections

m 27	Sun Plan.	Aries	Moon	v and d corr		
0	6°45.0	6°46.1	6°26.5	0.0 - 0.0	6.0 - 2.8	12.0 - 5.5
1	6°45.2	6°46.4	6°26.8	0.1 - 0.0	6.1 - 2.8	12.1 - 5.5
2	6°45.5	6°46.6	6°27.0	0.2 - 0.1	6.2 - 2.8	12.2 - 5.6
3	6°45.8	6°46.9	6°27.3	0.3 - 0.1	6.3 - 2.9	12.3 - 5.6
4	6°46.0	6°47.1	6°27.5	0.4 - 0.2	6.4 - 2.9	12.4 - 5.7
5	6°46.2	6°47.4	6°27.7	0.5 - 0.2	6.5 - 3.0	12.5 - 5.7
6	6°46.5	6°47.6	6°28.0	0.6 - 0.3	6.6 - 3.0	12.6 - 5.8
7	6°46.8	6°47.9	6°28.2	0.7 - 0.3	6.7 - 3.1	12.7 - 5.8
8	6°47.0	6°48.1	6°28.5	0.8 - 0.4	6.8 - 3.1	12.8 - 5.9
9	6°47.2	6°48.4	6°28.7	0.9 - 0.4	6.9 - 3.2	12.9 - 5.9
10	6°47.5	6°48.6	6°28.9	1.0 - 0.5	7.0 - 3.2	13.0 - 6.0
11	6°47.8	6°48.9	6°29.2	1.1 - 0.5	7.1 - 3.3	13.1 - 6.0
12	6°48.0	6°49.1	6°29.4	1.2 - 0.6	7.2 - 3.3	13.2 - 6.1
13	6°48.2	6°49.4	6°29.7	1.3 - 0.6	7.3 - 3.3	13.3 - 6.1
14	6°48.5	6°49.6	6°29.9	1.4 - 0.6	7.4 - 3.4	13.4 - 6.1
15	6°48.8	6°49.9	6°30.1	1.5 - 0.7	7.5 - 3.4	13.5 - 6.2
16	6°49.0	6°50.1	6°30.4	1.6 - 0.7	7.6 - 3.5	13.6 - 6.2
17	6°49.3	6°50.4	6°30.6	1.7 - 0.8	7.7 - 3.5	13.7 - 6.3
18	6°49.5	6°50.6	6°30.8	1.8 - 0.8	7.8 - 3.6	13.8 - 6.3
19	6°49.8	6°50.9	6°31.1	1.9 - 0.9	7.9 - 3.6	13.9 - 6.4
20	6°50.0	6°51.1	6°31.3	2.0 - 0.9	8.0 - 3.7	14.0 - 6.4
21	6°50.3	6°51.4	6°31.6	2.1 - 1.0	8.1 - 3.7	14.1 - 6.5
22	6°50.5	6°51.6	6°31.8	2.2 - 1.0	8.2 - 3.8	14.2 - 6.5
23	6°50.7	6°51.9	6°32.0	2.3 - 1.1	8.3 - 3.8	14.3 - 6.6
24	6°51.0	6°52.1	6°32.3	2.4 - 1.1	8.4 - 3.9	14.4 - 6.6
25	6°51.3	6°52.4	6°32.5	2.5 - 1.1	8.5 - 3.9	14.5 - 6.6
26	6°51.5	6°52.6	6°32.8	2.6 - 1.2	8.6 - 3.9	14.6 - 6.7
27	6°51.7	6°52.9	6°33.0	2.7 - 1.2	8.7 - 4.0	14.7 - 6.7
28	6°52.0	6°53.1	6°33.2	2.8 - 1.3	8.8 - 4.0	14.8 - 6.8
29	6°52.3	6°53.4	6°33.5	2.9 - 1.3	8.9 - 4.1	14.9 - 6.8
30	6°52.5	6°53.6	6°33.7	3.0 - 1.4	9.0 - 4.1	15.0 - 6.9
31	6°52.7	6°53.9	6°33.9	3.1 - 1.4	9.1 - 4.2	15.1 - 6.9
32	6°53.0	6°54.1	6°34.2	3.2 - 1.5	9.2 - 4.2	15.2 - 7.0
33	6°53.3	6°54.4	6°34.4	3.3 - 1.5	9.3 - 4.3	15.3 - 7.0
34	6°53.5	6°54.6	6°34.7	3.4 - 1.6	9.4 - 4.3	15.4 - 7.1
35	6°53.7	6°54.9	6°34.9	3.5 - 1.6	9.5 - 4.4	15.5 - 7.1
36	6°54.0	6°55.1	6°35.1	3.6 - 1.7	9.6 - 4.4	15.6 - 7.2
37	6°54.3	6°55.4	6°35.4	3.7 - 1.7	9.7 - 4.4	15.7 - 7.2
38	6°54.5	6°55.6	6°35.6	3.8 - 1.7	9.8 - 4.5	15.8 - 7.2
39	6°54.7	6°55.9	6°35.9	3.9 - 1.8	9.9 - 4.5	15.9 - 7.3
40	6°55.0	6°56.1	6°36.1	4.0 - 1.8	10.0 - 4.6	16.0 - 7.3
41	6°55.2	6°56.4	6°36.3	4.1 - 1.9	10.1 - 4.6	16.1 - 7.4
42	6°55.5	6°56.6	6°36.6	4.2 - 1.9	10.2 - 4.7	16.2 - 7.4
43	6°55.7	6°56.9	6°36.8	4.3 - 2.0	10.3 - 4.7	16.3 - 7.5
44	6°56.0	6°57.1	6°37.0	4.4 - 2.0	10.4 - 4.8	16.4 - 7.5
45	6°56.2	6°57.4	6°37.3	4.5 - 2.1	10.5 - 4.8	16.5 - 7.6
46	6°56.5	6°57.6	6°37.5	4.6 - 2.1	10.6 - 4.9	16.6 - 7.6
47	6°56.8	6°57.9	6°37.8	4.7 - 2.2	10.7 - 4.9	16.7 - 7.7
48	6°57.0	6°58.1	6°38.0	4.8 - 2.2	10.8 - 5.0	16.8 - 7.7
49	6°57.2	6°58.4	6°38.2	4.9 - 2.2	10.9 - 5.0	16.9 - 7.7
50	6°57.5	6°58.6	6°38.5	5.0 - 2.3	11.0 - 5.0	17.0 - 7.8
51	6°57.8	6°58.9	6°38.7	5.1 - 2.3	11.1 - 5.1	17.1 - 7.8
52	6°58.0	6°59.1	6°39.0	5.2 - 2.4	11.2 - 5.1	17.2 - 7.9
53	6°58.2	6°59.4	6°39.2	5.3 - 2.4	11.3 - 5.2	17.3 - 7.9
54	6°58.5	6°59.6	6°39.4	5.4 - 2.5	11.4 - 5.2	17.4 - 8.0
55	6°58.8	6°59.9	6°39.7	5.5 - 2.5	11.5 - 5.3	17.5 - 8.0
56	6°59.0	7°00.1	6°39.9	5.6 - 2.6	11.6 - 5.3	17.6 - 8.1
57	6°59.2	7°00.4	6°40.2	5.7 - 2.6	11.7 - 5.4	17.7 - 8.1
58	6°59.5	7°00.6	6°40.4	5.8 - 2.7	11.8 - 5.4	17.8 - 8.2
59	6°59.8	7°00.9	6°40.6	5.9 - 2.7	11.9 - 5.5	17.9 - 8.2

m 28	Sun Plan.	Aries	Moon	v and d corr		
0	7°00.0	7°01.1	6°40.9	0.0 - 0.0	6.0 - 2.8	12.0 - 5.7
1	7°00.2	7°01.4	6°41.1	0.1 - 0.0	6.1 - 2.9	12.1 - 5.7
2	7°00.5	7°01.6	6°41.3	0.2 - 0.1	6.2 - 2.9	12.2 - 5.8
3	7°00.8	7°01.9	6°41.6	0.3 - 0.1	6.3 - 3.0	12.3 - 5.8
4	7°01.0	7°02.2	6°41.8	0.4 - 0.2	6.4 - 3.0	12.4 - 5.9
5	7°01.2	7°02.4	6°42.1	0.5 - 0.2	6.5 - 3.1	12.5 - 5.9
6	7°01.5	7°02.7	6°42.3	0.6 - 0.3	6.6 - 3.1	12.6 - 6.0
7	7°01.8	7°02.9	6°42.5	0.7 - 0.3	6.7 - 3.2	12.7 - 6.0
8	7°02.0	7°03.2	6°42.8	0.8 - 0.4	6.8 - 3.2	12.8 - 6.1
9	7°02.2	7°03.4	6°43.0	0.9 - 0.4	6.9 - 3.3	12.9 - 6.1
10	7°02.5	7°03.7	6°43.3	1.0 - 0.5	7.0 - 3.3	13.0 - 6.2
11	7°02.8	7°03.9	6°43.5	1.1 - 0.5	7.1 - 3.4	13.1 - 6.2
12	7°03.0	7°04.2	6°43.7	1.2 - 0.6	7.2 - 3.4	13.2 - 6.3
13	7°03.2	7°04.4	6°44.0	1.3 - 0.6	7.3 - 3.5	13.3 - 6.3
14	7°03.5	7°04.7	6°44.2	1.4 - 0.7	7.4 - 3.5	13.4 - 6.4
15	7°03.8	7°04.9	6°44.4	1.5 - 0.7	7.5 - 3.6	13.5 - 6.4
16	7°04.0	7°05.2	6°44.7	1.6 - 0.8	7.6 - 3.6	13.6 - 6.5
17	7°04.3	7°05.4	6°44.9	1.7 - 0.8	7.7 - 3.7	13.7 - 6.5
18	7°04.5	7°05.7	6°45.2	1.8 - 0.9	7.8 - 3.7	13.8 - 6.6
19	7°04.7	7°05.9	6°45.4	1.9 - 0.9	7.9 - 3.8	13.9 - 6.6
20	7°05.0	7°06.2	6°45.6	2.0 - 1.0	8.0 - 3.8	14.0 - 6.7
21	7°05.3	7°06.4	6°45.9	2.1 - 1.0	8.1 - 3.8	14.1 - 6.7
22	7°05.5	7°06.7	6°46.1	2.2 - 1.0	8.2 - 3.9	14.2 - 6.7
23	7°05.7	7°06.9	6°46.4	2.3 - 1.1	8.3 - 3.9	14.3 - 6.8
24	7°06.0	7°07.2	6°46.6	2.4 - 1.1	8.4 - 4.0	14.4 - 6.8
25	7°06.3	7°07.4	6°46.8	2.5 - 1.2	8.5 - 4.0	14.5 - 6.9
26	7°06.5	7°07.7	6°47.1	2.6 - 1.2	8.6 - 4.1	14.6 - 6.9
27	7°06.7	7°07.9	6°47.3	2.7 - 1.3	8.7 - 4.1	14.7 - 7.0
28	7°07.0	7°08.2	6°47.5	2.8 - 1.3	8.8 - 4.2	14.8 - 7.0
29	7°07.3	7°08.4	6°47.8	2.9 - 1.4	8.9 - 4.2	14.9 - 7.1
30	7°07.5	7°08.7	6°48.0	3.0 - 1.4	9.0 - 4.3	15.0 - 7.1
31	7°07.7	7°08.9	6°48.3	3.1 - 1.5	9.1 - 4.3	15.1 - 7.2
32	7°08.0	7°09.2	6°48.5	3.2 - 1.5	9.2 - 4.4	15.2 - 7.2
33	7°08.3	7°09.4	6°48.7	3.3 - 1.6	9.3 - 4.4	15.3 - 7.3
34	7°08.5	7°09.7	6°49.0	3.4 - 1.6	9.4 - 4.5	15.4 - 7.3
35	7°08.7	7°09.9	6°49.2	3.5 - 1.7	9.5 - 4.5	15.5 - 7.4
36	7°09.0	7°10.2	6°49.5	3.6 - 1.7	9.6 - 4.6	15.6 - 7.4
37	7°09.3	7°10.4	6°49.7	3.7 - 1.8	9.7 - 4.6	15.7 - 7.5
38	7°09.5	7°10.7	6°49.9	3.8 - 1.8	9.8 - 4.7	15.8 - 7.5
39	7°09.7	7°10.9	6°50.2	3.9 - 1.9	9.9 - 4.7	15.9 - 7.6
40	7°10.0	7°11.2	6°50.4	4.0 - 1.9	10.0 - 4.8	16.0 - 7.6
41	7°10.3	7°11.4	6°50.6	4.1 - 1.9	10.1 - 4.8	16.1 - 7.6
42	7°10.5	7°11.7	6°50.9	4.2 - 2.0	10.2 - 4.8	16.2 - 7.7
43	7°10.7	7°11.9	6°51.1	4.3 - 2.0	10.3 - 4.9	16.3 - 7.7
44	7°11.0	7°12.2	6°51.4	4.4 - 2.1	10.4 - 4.9	16.4 - 7.8
45	7°11.2	7°12.4	6°51.6	4.5 - 2.1	10.5 - 5.0	16.5 - 7.8
46	7°11.5	7°12.7	6°51.8	4.6 - 2.2	10.6 - 5.0	16.6 - 7.9
47	7°11.8	7°12.9	6°52.1	4.7 - 2.2	10.7 - 5.1	16.7 - 7.9
48	7°12.0	7°13.2	6°52.3	4.8 - 2.3	10.8 - 5.1	16.8 - 8.0
49	7°12.2	7°13.4	6°52.6	4.9 - 2.3	10.9 - 5.2	16.9 - 8.0
50	7°12.5	7°13.7	6°52.8	5.0 - 2.4	11.0 - 5.2	17.0 - 8.1
51	7°12.8	7°13.9	6°53.0	5.1 - 2.4	11.1 - 5.3	17.1 - 8.1
52	7°13.0	7°14.2	6°53.3	5.2 - 2.5	11.2 - 5.3	17.2 - 8.2
53	7°13.2	7°14.4	6°53.5	5.3 - 2.5	11.3 - 5.4	17.3 - 8.2
54	7°13.5	7°14.7	6°53.8	5.4 - 2.6	11.4 - 5.4	17.4 - 8.3
55	7°13.8	7°14.9	6°54.0	5.5 - 2.6	11.5 - 5.5	17.5 - 8.3
56	7°14.0	7°15.2	6°54.2	5.6 - 2.7	11.6 - 5.5	17.6 - 8.4
57	7°14.2	7°15.4	6°54.5	5.7 - 2.7	11.7 - 5.6	17.7 - 8.4
58	7°14.5	7°15.7	6°54.7	5.8 - 2.8	11.8 - 5.6	17.8 - 8.5
59	7°14.8	7°15.9	6°54.9	5.9 - 2.8	11.9 - 5.7	17.9 - 8.5

m 29	Sun Plan.	Aries	Moon	v and d corr		
0	7°15.0	7°16.2	6°55.2	0.0 - 0.0	6.0 - 2.9	12.0 - 5.9
1	7°15.2	7°16.4	6°55.4	0.1 - 0.0	6.1 - 3.0	12.1 - 5.9
2	7°15.5	7°16.7	6°55.7	0.2 - 0.1	6.2 - 3.0	12.2 - 6.0
3	7°15.8	7°16.9	6°55.9	0.3 - 0.1	6.3 - 3.1	12.3 - 6.0
4	7°16.0	7°17.2	6°56.1	0.4 - 0.2	6.4 - 3.1	12.4 - 6.1
5	7°16.2	7°17.4	6°56.4	0.5 - 0.2	6.5 - 3.2	12.5 - 6.1
6	7°16.5	7°17.7	6°56.6	0.6 - 0.3	6.6 - 3.2	12.6 - 6.2
7	7°16.8	7°17.9	6°56.9	0.7 - 0.3	6.7 - 3.3	12.7 - 6.2
8	7°17.0	7°18.2	6°57.1	0.8 - 0.4	6.8 - 3.3	12.8 - 6.3
9	7°17.2	7°18.4	6°57.3	0.9 - 0.4	6.9 - 3.4	12.9 - 6.3
10	7°17.5	7°18.7	6°57.6	1.0 - 0.5	7.0 - 3.4	13.0 - 6.4
11	7°17.8	7°18.9	6°57.8	1.1 - 0.5	7.1 - 3.5	13.1 - 6.4
12	7°18.0	7°19.2	6°58.0	1.2 - 0.6	7.2 - 3.5	13.2 - 6.5
13	7°18.2	7°19.4	6°58.3	1.3 - 0.6	7.3 - 3.6	13.3 - 6.5
14	7°18.5	7°19.7	6°58.5	1.4 - 0.7	7.4 - 3.6	13.4 - 6.6
15	7°18.8	7°19.9	6°58.8	1.5 - 0.7	7.5 - 3.7	13.5 - 6.6
16	7°19.0	7°20.2	6°59.0	1.6 - 0.8	7.6 - 3.7	13.6 - 6.7
17	7°19.3	7°20.5	6°59.2	1.7 - 0.8	7.7 - 3.8	13.7 - 6.7
18	7°19.5	7°20.7	6°59.5	1.8 - 0.9	7.8 - 3.8	13.8 - 6.8
19	7°19.7	7°21.0	6°59.7	1.9 - 0.9	7.9 - 3.9	13.9 - 6.8
20	7°20.0	7°21.2	6°60.0	2.0 - 1.0	8.0 - 3.9	14.0 - 6.9
21	7°20.3	7°21.5	7°00.2	2.1 - 1.0	8.1 - 4.0	14.1 - 6.9
22	7°20.5	7°21.7	7°00.4	2.2 - 1.1	8.2 - 4.0	14.2 - 7.0
23	7°20.7	7°22.0	7°00.7	2.3 - 1.1	8.3 - 4.1	14.3 - 7.0
24	7°21.0	7°22.2	7°00.9	2.4 - 1.2	8.4 - 4.1	14.4 - 7.1
25	7°21.3	7°22.5	7°01.1	2.5 - 1.2	8.5 - 4.2	14.5 - 7.1
26	7°21.5	7°22.7	7°01.4	2.6 - 1.3	8.6 - 4.2	14.6 - 7.2
27	7°21.7	7°23.0	7°01.6	2.7 - 1.3	8.7 - 4.3	14.7 - 7.2
28	7°22.0	7°23.2	7°01.9	2.8 - 1.4	8.8 - 4.3	14.8 - 7.3
29	7°22.3	7°23.5	7°02.1	2.9 - 1.4	8.9 - 4.4	14.9 - 7.3
30	7°22.5	7°23.7	7°02.3	3.0 - 1.5	9.0 - 4.4	15.0 - 7.4
31	7°22.7	7°24.0	7°02.6	3.1 - 1.5	9.1 - 4.5	15.1 - 7.4
32	7°23.0	7°24.2	7°02.8	3.2 - 1.6	9.2 - 4.5	15.2 - 7.5
33	7°23.3	7°24.5	7°03.1	3.3 - 1.6	9.3 - 4.6	15.3 - 7.5
34	7°23.5	7°24.7	7°03.3	3.4 - 1.7	9.4 - 4.6	15.4 - 7.6
35	7°23.7	7°25.0	7°03.5	3.5 - 1.7	9.5 - 4.7	15.5 - 7.6
36	7°24.0	7°25.2	7°03.8	3.6 - 1.8	9.6 - 4.7	15.6 - 7.7
37	7°24.3	7°25.5	7°04.0	3.7 - 1.8	9.7 - 4.8	15.7 - 7.7
38	7°24.5	7°25.7	7°04.3	3.8 - 1.9	9.8 - 4.8	15.8 - 7.8
39	7°24.7	7°26.0	7°04.5	3.9 - 1.9	9.9 - 4.9	15.9 - 7.8
40	7°25.0	7°26.2	7°04.7	4.0 - 2.0	10.0 - 4.9	16.0 - 7.9
41	7°25.3	7°26.5	7°05.0	4.1 - 2.0	10.1 - 5.0	16.1 - 7.9
42	7°25.5	7°26.7	7°05.2	4.2 - 2.1	10.2 - 5.0	16.2 - 8.0
43	7°25.7	7°27.0	7°05.4	4.3 - 2.1	10.3 - 5.1	16.3 - 8.0
44	7°26.0	7°27.2	7°05.7	4.4 - 2.2	10.4 - 5.1	16.4 - 8.1
45	7°26.2	7°27.5	7°05.9	4.5 - 2.2	10.5 - 5.2	16.5 - 8.1
46	7°26.5	7°27.7	7°06.2	4.6 - 2.3	10.6 - 5.2	16.6 - 8.2
47	7°26.8	7°28.0	7°06.4	4.7 - 2.3	10.7 - 5.3	16.7 - 8.2
48	7°27.0	7°28.2	7°06.6	4.8 - 2.4	10.8 - 5.3	16.8 - 8.3
49	7°27.2	7°28.5	7°06.9	4.9 - 2.4	10.9 - 5.4	16.9 - 8.3
50	7°27.5	7°28.7	7°07.1	5.0 - 2.5	11.0 - 5.4	17.0 - 8.4
51	7°27.8	7°29.0	7°07.4	5.1 - 2.5	11.1 - 5.5	17.1 - 8.4
52	7°28.0	7°29.2	7°07.6	5.2 - 2.6	11.2 - 5.5	17.2 - 8.5
53	7°28.2	7°29.5	7°07.8	5.3 - 2.6	11.3 - 5.6	17.3 - 8.5
54	7°28.5	7°29.7	7°08.1	5.4 - 2.7	11.4 - 5.6	17.4 - 8.6
55	7°28.8	7°30.0	7°08.3	5.5 - 2.7	11.5 - 5.7	17.5 - 8.6
56	7°29.0	7°30.2	7°08.5	5.6 - 2.8	11.6 - 5.7	17.6 - 8.7
57	7°29.2	7°30.5	7°08.8	5.7 - 2.8	11.7 - 5.8	17.7 - 8.7
58	7°29.5	7°30.7	7°09.0	5.8 - 2.9	11.8 - 5.8	17.8 - 8.8
59	7°29.8	7°31.0	7°09.3	5.9 - 2.9	11.9 - 5.9	17.9 - 8.8

Increments and Corrections

m 30	Sun Plan.	Aries	Moon	v and d corr		
0	7°30.0	7°31.2	7°09.5	0.0 - 0.0	6.0 - 3.1	12.0 - 6.1
1	7°30.2	7°31.5	7°09.7	0.1 - 0.1	6.1 - 3.1	12.1 - 6.2
2	7°30.5	7°31.7	7°10.0	0.2 - 0.1	6.2 - 3.2	12.2 - 6.2
3	7°30.8	7°32.0	7°10.2	0.3 - 0.2	6.3 - 3.2	12.3 - 6.3
4	7°31.0	7°32.2	7°10.5	0.4 - 0.2	6.4 - 3.3	12.4 - 6.3
5	7°31.2	7°32.5	7°10.7	0.5 - 0.3	6.5 - 3.3	12.5 - 6.4
6	7°31.5	7°32.7	7°10.9	0.6 - 0.3	6.6 - 3.4	12.6 - 6.4
7	7°31.7	7°33.0	7°11.2	0.7 - 0.4	6.7 - 3.4	12.7 - 6.5
8	7°32.0	7°33.2	7°11.4	0.8 - 0.4	6.8 - 3.5	12.8 - 6.5
9	7°32.2	7°33.5	7°11.6	0.9 - 0.5	6.9 - 3.5	12.9 - 6.6
10	7°32.5	7°33.7	7°11.9	1.0 - 0.5	7.0 - 3.6	13.0 - 6.6
11	7°32.8	7°34.0	7°12.1	1.1 - 0.6	7.1 - 3.6	13.1 - 6.7
12	7°33.0	7°34.2	7°12.4	1.2 - 0.6	7.2 - 3.7	13.2 - 6.7
13	7°33.3	7°34.5	7°12.6	1.3 - 0.7	7.3 - 3.7	13.3 - 6.8
14	7°33.5	7°34.7	7°12.8	1.4 - 0.7	7.4 - 3.8	13.4 - 6.8
15	7°33.8	7°35.0	7°13.1	1.5 - 0.8	7.5 - 3.8	13.5 - 6.9
16	7°34.0	7°35.2	7°13.3	1.6 - 0.8	7.6 - 3.9	13.6 - 6.9
17	7°34.3	7°35.5	7°13.6	1.7 - 0.9	7.7 - 3.9	13.7 - 7.0
18	7°34.5	7°35.7	7°13.8	1.8 - 0.9	7.8 - 4.0	13.8 - 7.0
19	7°34.8	7°36.0	7°14.0	1.9 - 1.0	7.9 - 4.0	13.9 - 7.1
20	7°35.0	7°36.2	7°14.3	2.0 - 1.0	8.0 - 4.1	14.0 - 7.1
21	7°35.3	7°36.5	7°14.5	2.1 - 1.1	8.1 - 4.1	14.1 - 7.2
22	7°35.5	7°36.7	7°14.7	2.2 - 1.1	8.2 - 4.2	14.2 - 7.2
23	7°35.7	7°37.0	7°15.0	2.3 - 1.2	8.3 - 4.2	14.3 - 7.3
24	7°36.0	7°37.2	7°15.2	2.4 - 1.2	8.4 - 4.3	14.4 - 7.3
25	7°36.2	7°37.5	7°15.5	2.5 - 1.3	8.5 - 4.3	14.5 - 7.4
26	7°36.5	7°37.7	7°15.7	2.6 - 1.3	8.6 - 4.4	14.6 - 7.4
27	7°36.7	7°38.0	7°15.9	2.7 - 1.4	8.7 - 4.4	14.7 - 7.5
28	7°37.0	7°38.2	7°16.2	2.8 - 1.4	8.8 - 4.5	14.8 - 7.5
29	7°37.3	7°38.5	7°16.4	2.9 - 1.5	8.9 - 4.5	14.9 - 7.6
30	7°37.5	7°38.8	7°16.7	3.0 - 1.5	9.0 - 4.6	15.0 - 7.6
31	7°37.7	7°39.0	7°16.9	3.1 - 1.6	9.1 - 4.6	15.1 - 7.7
32	7°38.0	7°39.3	7°17.1	3.2 - 1.6	9.2 - 4.7	15.2 - 7.7
33	7°38.3	7°39.5	7°17.4	3.3 - 1.7	9.3 - 4.7	15.3 - 7.8
34	7°38.5	7°39.8	7°17.6	3.4 - 1.7	9.4 - 4.8	15.4 - 7.8
35	7°38.7	7°40.0	7°17.9	3.5 - 1.8	9.5 - 4.8	15.5 - 7.9
36	7°39.0	7°40.3	7°18.1	3.6 - 1.8	9.6 - 4.9	15.6 - 7.9
37	7°39.3	7°40.5	7°18.3	3.7 - 1.9	9.7 - 4.9	15.7 - 8.0
38	7°39.5	7°40.8	7°18.6	3.8 - 1.9	9.8 - 5.0	15.8 - 8.0
39	7°39.8	7°41.0	7°18.8	3.9 - 2.0	9.9 - 5.0	15.9 - 8.1
40	7°40.0	7°41.3	7°19.0	4.0 - 2.0	10.0 - 5.1	16.0 - 8.1
41	7°40.2	7°41.5	7°19.3	4.1 - 2.1	10.1 - 5.1	16.1 - 8.2
42	7°40.5	7°41.8	7°19.5	4.2 - 2.1	10.2 - 5.2	16.2 - 8.2
43	7°40.7	7°42.0	7°19.8	4.3 - 2.2	10.3 - 5.2	16.3 - 8.3
44	7°41.0	7°42.3	7°20.0	4.4 - 2.2	10.4 - 5.3	16.4 - 8.3
45	7°41.2	7°42.5	7°20.2	4.5 - 2.3	10.5 - 5.3	16.5 - 8.4
46	7°41.5	7°42.8	7°20.5	4.6 - 2.3	10.6 - 5.4	16.6 - 8.4
47	7°41.8	7°43.0	7°20.7	4.7 - 2.4	10.7 - 5.4	16.7 - 8.5
48	7°42.0	7°43.3	7°21.0	4.8 - 2.4	10.8 - 5.5	16.8 - 8.5
49	7°42.2	7°43.5	7°21.2	4.9 - 2.5	10.9 - 5.5	16.9 - 8.6
50	7°42.5	7°43.8	7°21.4	5.0 - 2.5	11.0 - 5.6	17.0 - 8.6
51	7°42.8	7°44.0	7°21.7	5.1 - 2.6	11.1 - 5.6	17.1 - 8.7
52	7°43.0	7°44.3	7°21.9	5.2 - 2.6	11.2 - 5.7	17.2 - 8.7
53	7°43.2	7°44.5	7°22.1	5.3 - 2.7	11.3 - 5.7	17.3 - 8.8
54	7°43.5	7°44.8	7°22.4	5.4 - 2.7	11.4 - 5.8	17.4 - 8.8
55	7°43.8	7°45.0	7°22.6	5.5 - 2.8	11.5 - 5.8	17.5 - 8.9
56	7°44.0	7°45.3	7°22.9	5.6 - 2.8	11.6 - 5.9	17.6 - 8.9
57	7°44.3	7°45.5	7°23.1	5.7 - 2.9	11.7 - 5.9	17.7 - 9.0
58	7°44.5	7°45.8	7°23.3	5.8 - 2.9	11.8 - 6.0	17.8 - 9.0
59	7°44.8	7°46.0	7°23.6	5.9 - 3.0	11.9 - 6.0	17.9 - 9.1

m 31	Sun Plan.	Aries	Moon	v and d corr		
0	7°45.0	7°46.3	7°23.8	0.0 - 0.0	6.0 - 3.2	12.0 - 6.3
1	7°45.2	7°46.5	7°24.1	0.1 - 0.1	6.1 - 3.2	12.1 - 6.4
2	7°45.5	7°46.8	7°24.3	0.2 - 0.1	6.2 - 3.3	12.2 - 6.4
3	7°45.7	7°47.0	7°24.5	0.3 - 0.2	6.3 - 3.3	12.3 - 6.5
4	7°46.0	7°47.3	7°24.8	0.4 - 0.2	6.4 - 3.4	12.4 - 6.5
5	7°46.2	7°47.5	7°25.0	0.5 - 0.3	6.5 - 3.4	12.5 - 6.6
6	7°46.5	7°47.8	7°25.2	0.6 - 0.3	6.6 - 3.5	12.6 - 6.6
7	7°46.8	7°48.0	7°25.5	0.7 - 0.4	6.7 - 3.5	12.7 - 6.7
8	7°47.0	7°48.3	7°25.7	0.8 - 0.4	6.8 - 3.6	12.8 - 6.7
9	7°47.2	7°48.5	7°26.0	0.9 - 0.5	6.9 - 3.6	12.9 - 6.8
10	7°47.5	7°48.8	7°26.2	1.0 - 0.5	7.0 - 3.7	13.0 - 6.8
11	7°47.7	7°49.0	7°26.4	1.1 - 0.6	7.1 - 3.7	13.1 - 6.9
12	7°48.0	7°49.3	7°26.7	1.2 - 0.6	7.2 - 3.8	13.2 - 6.9
13	7°48.2	7°49.5	7°26.9	1.3 - 0.7	7.3 - 3.8	13.3 - 7.0
14	7°48.5	7°49.8	7°27.2	1.4 - 0.7	7.4 - 3.9	13.4 - 7.0
15	7°48.8	7°50.0	7°27.4	1.5 - 0.8	7.5 - 3.9	13.5 - 7.1
16	7°49.0	7°50.3	7°27.6	1.6 - 0.8	7.6 - 4.0	13.6 - 7.1
17	7°49.3	7°50.5	7°27.9	1.7 - 0.9	7.7 - 4.0	13.7 - 7.2
18	7°49.5	7°50.8	7°28.1	1.8 - 0.9	7.8 - 4.1	13.8 - 7.2
19	7°49.8	7°51.0	7°28.4	1.9 - 1.0	7.9 - 4.1	13.9 - 7.3
20	7°50.0	7°51.3	7°28.6	2.0 - 1.1	8.0 - 4.2	14.0 - 7.4
21	7°50.3	7°51.5	7°28.8	2.1 - 1.1	8.1 - 4.3	14.1 - 7.4
22	7°50.5	7°51.8	7°29.1	2.2 - 1.2	8.2 - 4.3	14.2 - 7.5
23	7°50.7	7°52.0	7°29.3	2.3 - 1.2	8.3 - 4.4	14.3 - 7.5
24	7°51.0	7°52.3	7°29.5	2.4 - 1.3	8.4 - 4.4	14.4 - 7.6
25	7°51.3	7°52.5	7°29.8	2.5 - 1.3	8.5 - 4.5	14.5 - 7.6
26	7°51.5	7°52.8	7°30.0	2.6 - 1.4	8.6 - 4.5	14.6 - 7.7
27	7°51.7	7°53.0	7°30.3	2.7 - 1.4	8.7 - 4.6	14.7 - 7.7
28	7°52.0	7°53.3	7°30.5	2.8 - 1.5	8.8 - 4.6	14.8 - 7.8
29	7°52.2	7°53.5	7°30.7	2.9 - 1.5	8.9 - 4.7	14.9 - 7.8
30	7°52.5	7°53.8	7°31.0	3.0 - 1.6	9.0 - 4.7	15.0 - 7.9
31	7°52.7	7°54.0	7°31.2	3.1 - 1.6	9.1 - 4.8	15.1 - 7.9
32	7°53.0	7°54.3	7°31.5	3.2 - 1.7	9.2 - 4.8	15.2 - 8.0
33	7°53.3	7°54.5	7°31.7	3.3 - 1.7	9.3 - 4.9	15.3 - 8.0
34	7°53.5	7°54.8	7°31.9	3.4 - 1.8	9.4 - 4.9	15.4 - 8.1
35	7°53.8	7°55.0	7°32.2	3.5 - 1.8	9.5 - 5.0	15.5 - 8.1
36	7°54.0	7°55.3	7°32.4	3.6 - 1.9	9.6 - 5.0	15.6 - 8.2
37	7°54.3	7°55.5	7°32.6	3.7 - 1.9	9.7 - 5.1	15.7 - 8.2
38	7°54.5	7°55.8	7°32.9	3.8 - 2.0	9.8 - 5.1	15.8 - 8.3
39	7°54.7	7°56.0	7°33.1	3.9 - 2.0	9.9 - 5.2	15.9 - 8.3
40	7°55.0	7°56.3	7°33.4	4.0 - 2.1	10.0 - 5.3	16.0 - 8.4
41	7°55.3	7°56.5	7°33.6	4.1 - 2.2	10.1 - 5.3	16.1 - 8.5
42	7°55.5	7°56.8	7°33.8	4.2 - 2.2	10.2 - 5.4	16.2 - 8.5
43	7°55.7	7°57.1	7°34.1	4.3 - 2.3	10.3 - 5.4	16.3 - 8.6
44	7°56.0	7°57.3	7°34.3	4.4 - 2.3	10.4 - 5.5	16.4 - 8.6
45	7°56.2	7°57.6	7°34.6	4.5 - 2.4	10.5 - 5.5	16.5 - 8.7
46	7°56.5	7°57.8	7°34.8	4.6 - 2.4	10.6 - 5.6	16.6 - 8.7
47	7°56.7	7°58.1	7°35.0	4.7 - 2.5	10.7 - 5.6	16.7 - 8.8
48	7°57.0	7°58.3	7°35.3	4.8 - 2.5	10.8 - 5.7	16.8 - 8.8
49	7°57.2	7°58.6	7°35.5	4.9 - 2.6	10.9 - 5.7	16.9 - 8.9
50	7°57.5	7°58.8	7°35.7	5.0 - 2.6	11.0 - 5.8	17.0 - 8.9
51	7°57.8	7°59.1	7°36.0	5.1 - 2.7	11.1 - 5.8	17.1 - 9.0
52	7°58.0	7°59.3	7°36.2	5.2 - 2.7	11.2 - 5.9	17.2 - 9.0
53	7°58.2	7°59.6	7°36.5	5.3 - 2.8	11.3 - 5.9	17.3 - 9.1
54	7°58.5	7°59.8	7°36.7	5.4 - 2.8	11.4 - 6.0	17.4 - 9.1
55	7°58.8	8°00.1	7°36.9	5.5 - 2.9	11.5 - 6.0	17.5 - 9.2
56	7°59.0	8°00.3	7°37.2	5.6 - 2.9	11.6 - 6.1	17.6 - 9.2
57	7°59.2	8°00.6	7°37.4	5.7 - 3.0	11.7 - 6.1	17.7 - 9.3
58	7°59.5	8°00.8	7°37.7	5.8 - 3.0	11.8 - 6.2	17.8 - 9.3
59	7°59.8	8°01.1	7°37.9	5.9 - 3.1	11.9 - 6.2	17.9 - 9.4

m 32	Sun Plan.	Aries	Moon	v and d corr		
0	8°00.0	8°01.3	7°38.1	0.0 - 0.0	6.0 - 3.3	12.0 - 6.5
1	8°00.2	8°01.6	7°38.4	0.1 - 0.1	6.1 - 3.3	12.1 - 6.6
2	8°00.5	8°01.8	7°38.6	0.2 - 0.1	6.2 - 3.4	12.2 - 6.6
3	8°00.7	8°02.1	7°38.8	0.3 - 0.2	6.3 - 3.4	12.3 - 6.7
4	8°01.0	8°02.3	7°39.1	0.4 - 0.2	6.4 - 3.5	12.4 - 6.7
5	8°01.3	8°02.6	7°39.3	0.5 - 0.3	6.5 - 3.5	12.5 - 6.8
6	8°01.5	8°02.8	7°39.6	0.6 - 0.3	6.6 - 3.6	12.6 - 6.8
7	8°01.8	8°03.1	7°39.8	0.7 - 0.4	6.7 - 3.6	12.7 - 6.9
8	8°02.0	8°03.3	7°40.0	0.8 - 0.4	6.8 - 3.7	12.8 - 6.9
9	8°02.2	8°03.6	7°40.3	0.9 - 0.5	6.9 - 3.7	12.9 - 7.0
10	8°02.5	8°03.8	7°40.5	1.0 - 0.5	7.0 - 3.8	13.0 - 7.0
11	8°02.7	8°04.1	7°40.8	1.1 - 0.6	7.1 - 3.8	13.1 - 7.1
12	8°03.0	8°04.3	7°41.0	1.2 - 0.7	7.2 - 3.9	13.2 - 7.2
13	8°03.3	8°04.6	7°41.2	1.3 - 0.7	7.3 - 4.0	13.3 - 7.2
14	8°03.5	8°04.8	7°41.5	1.4 - 0.8	7.4 - 4.0	13.4 - 7.3
15	8°03.8	8°05.1	7°41.7	1.5 - 0.8	7.5 - 4.1	13.5 - 7.3
16	8°04.0	8°05.3	7°42.0	1.6 - 0.9	7.6 - 4.1	13.6 - 7.4
17	8°04.2	8°05.6	7°42.2	1.7 - 0.9	7.7 - 4.2	13.7 - 7.4
18	8°04.5	8°05.8	7°42.4	1.8 - 1.0	7.8 - 4.2	13.8 - 7.5
19	8°04.8	8°06.1	7°42.7	1.9 - 1.0	7.9 - 4.3	13.9 - 7.5
20	8°05.0	8°06.3	7°42.9	2.0 - 1.1	8.0 - 4.3	14.0 - 7.6
21	8°05.3	8°06.6	7°43.1	2.1 - 1.1	8.1 - 4.4	14.1 - 7.6
22	8°05.5	8°06.8	7°43.4	2.2 - 1.2	8.2 - 4.4	14.2 - 7.7
23	8°05.7	8°07.1	7°43.6	2.3 - 1.2	8.3 - 4.5	14.3 - 7.7
24	8°06.0	8°07.3	7°43.9	2.4 - 1.3	8.4 - 4.6	14.4 - 7.8
25	8°06.2	8°07.6	7°44.1	2.5 - 1.4	8.5 - 4.6	14.5 - 7.9
26	8°06.5	8°07.8	7°44.3	2.6 - 1.4	8.6 - 4.7	14.6 - 7.9
27	8°06.8	8°08.1	7°44.6	2.7 - 1.5	8.7 - 4.7	14.7 - 8.0
28	8°07.0	8°08.3	7°44.8	2.8 - 1.5	8.8 - 4.8	14.8 - 8.0
29	8°07.3	8°08.6	7°45.1	2.9 - 1.6	8.9 - 4.8	14.9 - 8.1
30	8°07.5	8°08.8	7°45.3	3.0 - 1.6	9.0 - 4.9	15.0 - 8.1
31	8°07.7	8°09.1	7°45.5	3.1 - 1.7	9.1 - 4.9	15.1 - 8.2
32	8°08.0	8°09.3	7°45.8	3.2 - 1.7	9.2 - 5.0	15.2 - 8.2
33	8°08.2	8°09.6	7°46.0	3.3 - 1.8	9.3 - 5.0	15.3 - 8.3
34	8°08.5	8°09.8	7°46.2	3.4 - 1.8	9.4 - 5.1	15.4 - 8.3
35	8°08.8	8°10.1	7°46.5	3.5 - 1.9	9.5 - 5.1	15.5 - 8.4
36	8°09.0	8°10.3	7°46.7	3.6 - 2.0	9.6 - 5.2	15.6 - 8.5
37	8°09.3	8°10.6	7°47.0	3.7 - 2.0	9.7 - 5.3	15.7 - 8.5
38	8°09.5	8°10.8	7°47.2	3.8 - 2.1	9.8 - 5.3	15.8 - 8.6
39	8°09.7	8°11.1	7°47.4	3.9 - 2.1	9.9 - 5.4	15.9 - 8.6
40	8°10.0	8°11.3	7°47.7	4.0 - 2.2	10.0 - 5.4	16.0 - 8.7
41	8°10.2	8°11.6	7°47.9	4.1 - 2.2	10.1 - 5.5	16.1 - 8.7
42	8°10.5	8°11.8	7°48.2	4.2 - 2.3	10.2 - 5.5	16.2 - 8.8
43	8°10.8	8°12.1	7°48.4	4.3 - 2.3	10.3 - 5.6	16.3 - 8.8
44	8°11.0	8°12.3	7°48.6	4.4 - 2.4	10.4 - 5.6	16.4 - 8.9
45	8°11.2	8°12.6	7°48.9	4.5 - 2.4	10.5 - 5.7	16.5 - 8.9
46	8°11.5	8°12.8	7°49.1	4.6 - 2.5	10.6 - 5.7	16.6 - 9.0
47	8°11.7	8°13.1	7°49.3	4.7 - 2.5	10.7 - 5.8	16.7 - 9.0
48	8°12.0	8°13.3	7°49.6	4.8 - 2.6	10.8 - 5.9	16.8 - 9.1
49	8°12.3	8°13.6	7°49.8	4.9 - 2.7	10.9 - 5.9	16.9 - 9.2
50	8°12.5	8°13.8	7°50.1	5.0 - 2.7	11.0 - 6.0	17.0 - 9.2
51	8°12.8	8°14.1	7°50.3	5.1 - 2.8	11.1 - 6.0	17.1 - 9.3
52	8°13.0	8°14.3	7°50.5	5.2 - 2.8	11.2 - 6.1	17.2 - 9.3
53	8°13.2	8°14.6	7°50.8	5.3 - 2.9	11.3 - 6.1	17.3 - 9.4
54	8°13.5	8°14.8	7°51.0	5.4 - 2.9	11.4 - 6.2	17.4 - 9.4
55	8°13.7	8°15.1	7°51.3	5.5 - 3.0	11.5 - 6.2	17.5 - 9.5
56	8°14.0	8°15.4	7°51.5	5.6 - 3.0	11.6 - 6.3	17.6 - 9.5
57	8°14.3	8°15.6	7°51.7	5.7 - 3.1	11.7 - 6.3	17.7 - 9.6
58	8°14.5	8°15.9	7°52.0	5.8 - 3.1	11.8 - 6.4	17.8 - 9.6
59	8°14.8	8°16.1	7°52.2	5.9 - 3.2	11.9 - 6.4	17.9 - 9.7

Increments and Corrections

m 33	Sun Plan.	Aries	Moon	v and d corr		
0	8°15.0	8°16.4	7°52.5	0.0 - 0.0	6.0 - 3.4	12.0 - 6.7
1	8°15.2	8°16.6	7°52.7	0.1 - 0.1	6.1 - 3.4	12.1 - 6.8
2	8°15.5	8°16.9	7°52.9	0.2 - 0.1	6.2 - 3.5	12.2 - 6.8
3	8°15.7	8°17.1	7°53.2	0.3 - 0.2	6.3 - 3.5	12.3 - 6.9
4	8°16.0	8°17.4	7°53.4	0.4 - 0.2	6.4 - 3.6	12.4 - 6.9
5	8°16.3	8°17.6	7°53.6	0.5 - 0.3	6.5 - 3.6	12.5 - 7.0
6	8°16.5	8°17.9	7°53.9	0.6 - 0.3	6.6 - 3.7	12.6 - 7.0
7	8°16.8	8°18.1	7°54.1	0.7 - 0.4	6.7 - 3.7	12.7 - 7.1
8	8°17.0	8°18.4	7°54.4	0.8 - 0.4	6.8 - 3.8	12.8 - 7.1
9	8°17.2	8°18.6	7°54.6	0.9 - 0.5	6.9 - 3.9	12.9 - 7.2
10	8°17.5	8°18.9	7°54.8	1.0 - 0.6	7.0 - 3.9	13.0 - 7.3
11	8°17.7	8°19.1	7°55.1	1.1 - 0.6	7.1 - 4.0	13.1 - 7.3
12	8°18.0	8°19.4	7°55.3	1.2 - 0.7	7.2 - 4.0	13.2 - 7.4
13	8°18.3	8°19.6	7°55.6	1.3 - 0.7	7.3 - 4.1	13.3 - 7.4
14	8°18.5	8°19.9	7°55.8	1.4 - 0.8	7.4 - 4.1	13.4 - 7.5
15	8°18.8	8°20.1	7°56.0	1.5 - 0.8	7.5 - 4.2	13.5 - 7.5
16	8°19.0	8°20.4	7°56.3	1.6 - 0.9	7.6 - 4.2	13.6 - 7.6
17	8°19.2	8°20.6	7°56.5	1.7 - 0.9	7.7 - 4.3	13.7 - 7.6
18	8°19.5	8°20.9	7°56.7	1.8 - 1.0	7.8 - 4.4	13.8 - 7.7
19	8°19.8	8°21.1	7°57.0	1.9 - 1.1	7.9 - 4.4	13.9 - 7.8
20	8°20.0	8°21.4	7°57.2	2.0 - 1.1	8.0 - 4.5	14.0 - 7.8
21	8°20.3	8°21.6	7°57.5	2.1 - 1.2	8.1 - 4.5	14.1 - 7.9
22	8°20.5	8°21.9	7°57.7	2.2 - 1.2	8.2 - 4.6	14.2 - 7.9
23	8°20.7	8°22.1	7°57.9	2.3 - 1.3	8.3 - 4.6	14.3 - 8.0
24	8°21.0	8°22.4	7°58.2	2.4 - 1.3	8.4 - 4.7	14.4 - 8.0
25	8°21.2	8°22.6	7°58.4	2.5 - 1.4	8.5 - 4.7	14.5 - 8.1
26	8°21.5	8°22.9	7°58.7	2.6 - 1.5	8.6 - 4.8	14.6 - 8.2
27	8°21.8	8°23.1	7°58.9	2.7 - 1.5	8.7 - 4.9	14.7 - 8.2
28	8°22.0	8°23.4	7°59.1	2.8 - 1.6	8.8 - 4.9	14.8 - 8.3
29	8°22.3	8°23.6	7°59.4	2.9 - 1.6	8.9 - 5.0	14.9 - 8.3
30	8°22.5	8°23.9	7°59.6	3.0 - 1.7	9.0 - 5.0	15.0 - 8.4
31	8°22.7	8°24.1	7°59.8	3.1 - 1.7	9.1 - 5.1	15.1 - 8.4
32	8°23.0	8°24.4	8°00.1	3.2 - 1.8	9.2 - 5.1	15.2 - 8.5
33	8°23.2	8°24.6	8°00.3	3.3 - 1.8	9.3 - 5.2	15.3 - 8.5
34	8°23.5	8°24.9	8°00.6	3.4 - 1.9	9.4 - 5.2	15.4 - 8.6
35	8°23.8	8°25.1	8°00.8	3.5 - 2.0	9.5 - 5.3	15.5 - 8.7
36	8°24.0	8°25.4	8°01.0	3.6 - 2.0	9.6 - 5.4	15.6 - 8.7
37	8°24.3	8°25.6	8°01.3	3.7 - 2.1	9.7 - 5.4	15.7 - 8.8
38	8°24.5	8°25.9	8°01.5	3.8 - 2.1	9.8 - 5.5	15.8 - 8.8
39	8°24.7	8°26.1	8°01.8	3.9 - 2.2	9.9 - 5.5	15.9 - 8.9
40	8°25.0	8°26.4	8°02.0	4.0 - 2.2	10.0 - 5.6	16.0 - 8.9
41	8°25.2	8°26.6	8°02.2	4.1 - 2.3	10.1 - 5.6	16.1 - 9.0
42	8°25.5	8°26.9	8°02.5	4.2 - 2.3	10.2 - 5.7	16.2 - 9.0
43	8°25.8	8°27.1	8°02.7	4.3 - 2.4	10.3 - 5.8	16.3 - 9.1
44	8°26.0	8°27.4	8°02.9	4.4 - 2.5	10.4 - 5.8	16.4 - 9.2
45	8°26.2	8°27.6	8°03.2	4.5 - 2.5	10.5 - 5.9	16.5 - 9.2
46	8°26.5	8°27.9	8°03.4	4.6 - 2.6	10.6 - 5.9	16.6 - 9.3
47	8°26.7	8°28.1	8°03.7	4.7 - 2.6	10.7 - 6.0	16.7 - 9.3
48	8°27.0	8°28.4	8°03.9	4.8 - 2.7	10.8 - 6.0	16.8 - 9.4
49	8°27.3	8°28.6	8°04.1	4.9 - 2.7	10.9 - 6.1	16.9 - 9.4
50	8°27.5	8°28.9	8°04.4	5.0 - 2.8	11.0 - 6.1	17.0 - 9.5
51	8°27.8	8°29.1	8°04.6	5.1 - 2.8	11.1 - 6.2	17.1 - 9.5
52	8°28.0	8°29.4	8°04.9	5.2 - 2.9	11.2 - 6.3	17.2 - 9.6
53	8°28.2	8°29.6	8°05.1	5.3 - 3.0	11.3 - 6.3	17.3 - 9.7
54	8°28.5	8°29.9	8°05.3	5.4 - 3.0	11.4 - 6.4	17.4 - 9.7
55	8°28.7	8°30.1	8°05.6	5.5 - 3.1	11.5 - 6.4	17.5 - 9.8
56	8°29.0	8°30.4	8°05.8	5.6 - 3.1	11.6 - 6.5	17.6 - 9.8
57	8°29.3	8°30.6	8°06.1	5.7 - 3.2	11.7 - 6.5	17.7 - 9.9
58	8°29.5	8°30.9	8°06.3	5.8 - 3.2	11.8 - 6.6	17.8 - 9.9
59	8°29.8	8°31.1	8°06.5	5.9 - 3.3	11.9 - 6.6	17.9 - 10.0

m 34	Sun Plan.	Aries	Moon	v and d corr		
0	8°30.0	8°31.4	8°06.8	0.0 - 0.0	6.0 - 3.5	12.0 - 6.9
1	8°30.2	8°31.6	8°07.0	0.1 - 0.1	6.1 - 3.5	12.1 - 7.0
2	8°30.5	8°31.9	8°07.2	0.2 - 0.1	6.2 - 3.6	12.2 - 7.0
3	8°30.7	8°32.1	8°07.5	0.3 - 0.2	6.3 - 3.6	12.3 - 7.1
4	8°31.0	8°32.4	8°07.7	0.4 - 0.2	6.4 - 3.7	12.4 - 7.1
5	8°31.3	8°32.6	8°08.0	0.5 - 0.3	6.5 - 3.7	12.5 - 7.2
6	8°31.5	8°32.9	8°08.2	0.6 - 0.3	6.6 - 3.8	12.6 - 7.2
7	8°31.8	8°33.1	8°08.4	0.7 - 0.4	6.7 - 3.9	12.7 - 7.3
8	8°32.0	8°33.4	8°08.7	0.8 - 0.5	6.8 - 3.9	12.8 - 7.4
9	8°32.2	8°33.7	8°08.9	0.9 - 0.5	6.9 - 4.0	12.9 - 7.4
10	8°32.5	8°33.9	8°09.2	1.0 - 0.6	7.0 - 4.0	13.0 - 7.5
11	8°32.7	8°34.2	8°09.4	1.1 - 0.6	7.1 - 4.1	13.1 - 7.5
12	8°33.0	8°34.4	8°09.6	1.2 - 0.7	7.2 - 4.1	13.2 - 7.6
13	8°33.3	8°34.7	8°09.9	1.3 - 0.7	7.3 - 4.2	13.3 - 7.6
14	8°33.5	8°34.9	8°10.1	1.4 - 0.8	7.4 - 4.3	13.4 - 7.7
15	8°33.8	8°35.2	8°10.3	1.5 - 0.9	7.5 - 4.3	13.5 - 7.8
16	8°34.0	8°35.4	8°10.6	1.6 - 0.9	7.6 - 4.4	13.6 - 7.8
17	8°34.2	8°35.7	8°10.8	1.7 - 1.0	7.7 - 4.4	13.7 - 7.9
18	8°34.5	8°35.9	8°11.1	1.8 - 1.0	7.8 - 4.5	13.8 - 7.9
19	8°34.8	8°36.2	8°11.3	1.9 - 1.1	7.9 - 4.5	13.9 - 8.0
20	8°35.0	8°36.4	8°11.5	2.0 - 1.2	8.0 - 4.6	14.0 - 8.0
21	8°35.3	8°36.7	8°11.8	2.1 - 1.2	8.1 - 4.7	14.1 - 8.1
22	8°35.5	8°36.9	8°12.0	2.2 - 1.3	8.2 - 4.7	14.2 - 8.2
23	8°35.7	8°37.2	8°12.3	2.3 - 1.3	8.3 - 4.8	14.3 - 8.2
24	8°36.0	8°37.4	8°12.5	2.4 - 1.4	8.4 - 4.8	14.4 - 8.3
25	8°36.2	8°37.7	8°12.7	2.5 - 1.4	8.5 - 4.9	14.5 - 8.3
26	8°36.5	8°37.9	8°13.0	2.6 - 1.5	8.6 - 4.9	14.6 - 8.4
27	8°36.8	8°38.2	8°13.2	2.7 - 1.6	8.7 - 5.0	14.7 - 8.5
28	8°37.0	8°38.4	8°13.4	2.8 - 1.6	8.8 - 5.1	14.8 - 8.5
29	8°37.3	8°38.7	8°13.7	2.9 - 1.7	8.9 - 5.1	14.9 - 8.6
30	8°37.5	8°38.9	8°13.9	3.0 - 1.7	9.0 - 5.2	15.0 - 8.6
31	8°37.7	8°39.2	8°14.2	3.1 - 1.8	9.1 - 5.2	15.1 - 8.7
32	8°38.0	8°39.4	8°14.4	3.2 - 1.8	9.2 - 5.3	15.2 - 8.7
33	8°38.2	8°39.7	8°14.6	3.3 - 1.9	9.3 - 5.3	15.3 - 8.8
34	8°38.5	8°39.9	8°14.9	3.4 - 2.0	9.4 - 5.4	15.4 - 8.9
35	8°38.8	8°40.2	8°15.1	3.5 - 2.0	9.5 - 5.5	15.5 - 8.9
36	8°39.0	8°40.4	8°15.4	3.6 - 2.1	9.6 - 5.5	15.6 - 9.0
37	8°39.3	8°40.7	8°15.6	3.7 - 2.1	9.7 - 5.6	15.7 - 9.0
38	8°39.5	8°40.9	8°15.8	3.8 - 2.2	9.8 - 5.6	15.8 - 9.1
39	8°39.7	8°41.2	8°16.1	3.9 - 2.2	9.9 - 5.7	15.9 - 9.1
40	8°40.0	8°41.4	8°16.3	4.0 - 2.3	10.0 - 5.8	16.0 - 9.2
41	8°40.2	8°41.7	8°16.5	4.1 - 2.4	10.1 - 5.8	16.1 - 9.3
42	8°40.5	8°41.9	8°16.8	4.2 - 2.4	10.2 - 5.9	16.2 - 9.3
43	8°40.8	8°42.2	8°17.0	4.3 - 2.5	10.3 - 5.9	16.3 - 9.4
44	8°41.0	8°42.4	8°17.3	4.4 - 2.5	10.4 - 6.0	16.4 - 9.4
45	8°41.2	8°42.7	8°17.5	4.5 - 2.6	10.5 - 6.0	16.5 - 9.5
46	8°41.5	8°42.9	8°17.7	4.6 - 2.6	10.6 - 6.1	16.6 - 9.5
47	8°41.7	8°43.2	8°18.0	4.7 - 2.7	10.7 - 6.2	16.7 - 9.6
48	8°42.0	8°43.4	8°18.2	4.8 - 2.8	10.8 - 6.2	16.8 - 9.7
49	8°42.3	8°43.7	8°18.5	4.9 - 2.8	10.9 - 6.3	16.9 - 9.7
50	8°42.5	8°43.9	8°18.7	5.0 - 2.9	11.0 - 6.3	17.0 - 9.8
51	8°42.8	8°44.2	8°18.9	5.1 - 2.9	11.1 - 6.4	17.1 - 9.8
52	8°43.0	8°44.4	8°19.2	5.2 - 3.0	11.2 - 6.4	17.2 - 9.9
53	8°43.2	8°44.7	8°19.4	5.3 - 3.0	11.3 - 6.5	17.3 - 9.9
54	8°43.5	8°44.9	8°19.7	5.4 - 3.1	11.4 - 6.6	17.4 - 10.0
55	8°43.7	8°45.2	8°19.9	5.5 - 3.2	11.5 - 6.6	17.5 - 10.1
56	8°44.0	8°45.4	8°20.1	5.6 - 3.2	11.6 - 6.7	17.6 - 10.1
57	8°44.3	8°45.7	8°20.4	5.7 - 3.3	11.7 - 6.7	17.7 - 10.2
58	8°44.5	8°45.9	8°20.6	5.8 - 3.3	11.8 - 6.8	17.8 - 10.2
59	8°44.8	8°46.2	8°20.8	5.9 - 3.4	11.9 - 6.8	17.9 - 10.3

m 35	Sun Plan.	Aries	Moon	v and d corr		
0	8°45.0	8°46.4	8°21.1	0.0 - 0.0	6.0 - 3.6	12.0 - 7.1
1	8°45.2	8°46.7	8°21.3	0.1 - 0.1	6.1 - 3.6	12.1 - 7.2
2	8°45.5	8°46.9	8°21.6	0.2 - 0.1	6.2 - 3.7	12.2 - 7.2
3	8°45.7	8°47.2	8°21.8	0.3 - 0.2	6.3 - 3.7	12.3 - 7.3
4	8°46.0	8°47.4	8°22.0	0.4 - 0.2	6.4 - 3.8	12.4 - 7.3
5	8°46.3	8°47.7	8°22.3	0.5 - 0.3	6.5 - 3.8	12.5 - 7.4
6	8°46.5	8°47.9	8°22.5	0.6 - 0.4	6.6 - 3.9	12.6 - 7.5
7	8°46.8	8°48.2	8°22.8	0.7 - 0.4	6.7 - 4.0	12.7 - 7.5
8	8°47.0	8°48.4	8°23.0	0.8 - 0.5	6.8 - 4.0	12.8 - 7.6
9	8°47.2	8°48.7	8°23.2	0.9 - 0.5	6.9 - 4.1	12.9 - 7.6
10	8°47.5	8°48.9	8°23.5	1.0 - 0.6	7.0 - 4.1	13.0 - 7.7
11	8°47.7	8°49.2	8°23.7	1.1 - 0.7	7.1 - 4.2	13.1 - 7.8
12	8°48.0	8°49.4	8°23.9	1.2 - 0.7	7.2 - 4.3	13.2 - 7.8
13	8°48.3	8°49.7	8°24.2	1.3 - 0.8	7.3 - 4.3	13.3 - 7.9
14	8°48.5	8°49.9	8°24.4	1.4 - 0.8	7.4 - 4.4	13.4 - 7.9
15	8°48.8	8°50.2	8°24.7	1.5 - 0.9	7.5 - 4.4	13.5 - 8.0
16	8°49.0	8°50.4	8°24.9	1.6 - 0.9	7.6 - 4.5	13.6 - 8.0
17	8°49.2	8°50.7	8°25.1	1.7 - 1.0	7.7 - 4.6	13.7 - 8.1
18	8°49.5	8°50.9	8°25.4	1.8 - 1.1	7.8 - 4.6	13.8 - 8.2
19	8°49.8	8°51.2	8°25.6	1.9 - 1.1	7.9 - 4.7	13.9 - 8.2
20	8°50.0	8°51.4	8°25.9	2.0 - 1.2	8.0 - 4.7	14.0 - 8.3
21	8°50.3	8°51.7	8°26.1	2.1 - 1.2	8.1 - 4.8	14.1 - 8.3
22	8°50.5	8°52.0	8°26.3	2.2 - 1.3	8.2 - 4.9	14.2 - 8.4
23	8°50.7	8°52.2	8°26.6	2.3 - 1.4	8.3 - 4.9	14.3 - 8.5
24	8°51.0	8°52.5	8°26.8	2.4 - 1.4	8.4 - 5.0	14.4 - 8.5
25	8°51.2	8°52.7	8°27.0	2.5 - 1.5	8.5 - 5.0	14.5 - 8.6
26	8°51.5	8°53.0	8°27.3	2.6 - 1.5	8.6 - 5.1	14.6 - 8.6
27	8°51.8	8°53.2	8°27.5	2.7 - 1.6	8.7 - 5.1	14.7 - 8.7
28	8°52.0	8°53.5	8°27.8	2.8 - 1.7	8.8 - 5.2	14.8 - 8.8
29	8°52.3	8°53.7	8°28.0	2.9 - 1.7	8.9 - 5.3	14.9 - 8.8
30	8°52.5	8°54.0	8°28.2	3.0 - 1.8	9.0 - 5.3	15.0 - 8.9
31	8°52.7	8°54.2	8°28.5	3.1 - 1.8	9.1 - 5.4	15.1 - 8.9
32	8°53.0	8°54.5	8°28.7	3.2 - 1.9	9.2 - 5.4	15.2 - 9.0
33	8°53.2	8°54.7	8°29.0	3.3 - 2.0	9.3 - 5.5	15.3 - 9.1
34	8°53.5	8°55.0	8°29.2	3.4 - 2.0	9.4 - 5.6	15.4 - 9.1
35	8°53.8	8°55.2	8°29.4	3.5 - 2.1	9.5 - 5.6	15.5 - 9.2
36	8°54.0	8°55.5	8°29.7	3.6 - 2.1	9.6 - 5.7	15.6 - 9.2
37	8°54.3	8°55.7	8°29.9	3.7 - 2.2	9.7 - 5.7	15.7 - 9.3
38	8°54.5	8°56.0	8°30.2	3.8 - 2.2	9.8 - 5.8	15.8 - 9.3
39	8°54.7	8°56.2	8°30.4	3.9 - 2.3	9.9 - 5.9	15.9 - 9.4
40	8°55.0	8°56.5	8°30.6	4.0 - 2.4	10.0 - 5.9	16.0 - 9.5
41	8°55.2	8°56.7	8°30.9	4.1 - 2.4	10.1 - 6.0	16.1 - 9.5
42	8°55.5	8°57.0	8°31.1	4.2 - 2.5	10.2 - 6.0	16.2 - 9.6
43	8°55.8	8°57.2	8°31.3	4.3 - 2.5	10.3 - 6.1	16.3 - 9.6
44	8°56.0	8°57.5	8°31.6	4.4 - 2.6	10.4 - 6.2	16.4 - 9.7
45	8°56.2	8°57.7	8°31.8	4.5 - 2.7	10.5 - 6.2	16.5 - 9.8
46	8°56.5	8°58.0	8°32.1	4.6 - 2.7	10.6 - 6.3	16.6 - 9.8
47	8°56.7	8°58.2	8°32.3	4.7 - 2.8	10.7 - 6.3	16.7 - 9.9
48	8°57.0	8°58.5	8°32.5	4.8 - 2.8	10.8 - 6.4	16.8 - 9.9
49	8°57.3	8°58.7	8°32.8	4.9 - 2.9	10.9 - 6.4	16.9 - 10.0
50	8°57.5	8°59.0	8°33.0	5.0 - 3.0	11.0 - 6.5	17.0 - 10.1
51	8°57.8	8°59.2	8°33.3	5.1 - 3.0	11.1 - 6.6	17.1 - 10.1
52	8°58.0	8°59.5	8°33.5	5.2 - 3.1	11.2 - 6.6	17.2 - 10.2
53	8°58.2	8°59.7	8°33.7	5.3 - 3.1	11.3 - 6.7	17.3 - 10.2
54	8°58.5	8°60.0	8°34.0	5.4 - 3.2	11.4 - 6.7	17.4 - 10.3
55	8°58.7	9°00.2	8°34.2	5.5 - 3.3	11.5 - 6.8	17.5 - 10.4
56	8°59.0	9°00.5	8°34.4	5.6 - 3.3	11.6 - 6.9	17.6 - 10.4
57	8°59.3	9°00.7	8°34.7	5.7 - 3.4	11.7 - 6.9	17.7 - 10.5
58	8°59.5	9°01.0	8°34.9	5.8 - 3.4	11.8 - 7.0	17.8 - 10.5
59	8°59.8	9°01.2	8°35.2	5.9 - 3.5	11.9 - 7.0	17.9 - 10.6

Increments and Corrections

m 36	Sun Plan.	Aries	Moon	v and d corr		
0	9°00.0	9°01.5	8°35.4	0.0 - 0.0	6.0 - 3.6	12.0 - 7.3
1	9°00.2	9°01.7	8°35.6	0.1 - 0.1	6.1 - 3.7	12.1 - 7.4
2	9°00.5	9°02.0	8°35.9	0.2 - 0.1	6.2 - 3.8	12.2 - 7.4
3	9°00.7	9°02.2	8°36.1	0.3 - 0.2	6.3 - 3.8	12.3 - 7.5
4	9°01.0	9°02.5	8°36.4	0.4 - 0.2	6.4 - 3.9	12.4 - 7.5
5	9°01.3	9°02.7	8°36.6	0.5 - 0.3	6.5 - 4.0	12.5 - 7.6
6	9°01.5	9°03.0	8°36.8	0.6 - 0.4	6.6 - 4.0	12.6 - 7.7
7	9°01.8	9°03.2	8°37.1	0.7 - 0.4	6.7 - 4.1	12.7 - 7.7
8	9°02.0	9°03.5	8°37.3	0.8 - 0.5	6.8 - 4.1	12.8 - 7.8
9	9°02.2	9°03.7	8°37.5	0.9 - 0.5	6.9 - 4.2	12.9 - 7.8
10	9°02.5	9°04.0	8°37.8	1.0 - 0.6	7.0 - 4.3	13.0 - 7.9
11	9°02.7	9°04.2	8°38.0	1.1 - 0.7	7.1 - 4.3	13.1 - 8.0
12	9°03.0	9°04.5	8°38.3	1.2 - 0.7	7.2 - 4.4	13.2 - 8.0
13	9°03.3	9°04.7	8°38.5	1.3 - 0.8	7.3 - 4.4	13.3 - 8.1
14	9°03.5	9°05.0	8°38.7	1.4 - 0.9	7.4 - 4.5	13.4 - 8.2
15	9°03.8	9°05.2	8°39.0	1.5 - 0.9	7.5 - 4.6	13.5 - 8.2
16	9°04.0	9°05.5	8°39.2	1.6 - 1.0	7.6 - 4.6	13.6 - 8.3
17	9°04.2	9°05.7	8°39.5	1.7 - 1.0	7.7 - 4.7	13.7 - 8.3
18	9°04.5	9°06.0	8°39.7	1.8 - 1.1	7.8 - 4.7	13.8 - 8.4
19	9°04.8	9°06.2	8°39.9	1.9 - 1.2	7.9 - 4.8	13.9 - 8.5
20	9°05.0	9°06.5	8°40.2	2.0 - 1.2	8.0 - 4.9	14.0 - 8.5
21	9°05.3	9°06.7	8°40.4	2.1 - 1.3	8.1 - 4.9	14.1 - 8.6
22	9°05.5	9°07.0	8°40.6	2.2 - 1.3	8.2 - 5.0	14.2 - 8.6
23	9°05.7	9°07.2	8°40.9	2.3 - 1.4	8.3 - 5.0	14.3 - 8.7
24	9°06.0	9°07.5	8°41.1	2.4 - 1.5	8.4 - 5.1	14.4 - 8.8
25	9°06.2	9°07.7	8°41.4	2.5 - 1.5	8.5 - 5.2	14.5 - 8.8
26	9°06.5	9°08.0	8°41.6	2.6 - 1.6	8.6 - 5.2	14.6 - 8.9
27	9°06.8	9°08.2	8°41.8	2.7 - 1.6	8.7 - 5.3	14.7 - 8.9
28	9°07.0	9°08.5	8°42.1	2.8 - 1.7	8.8 - 5.4	14.8 - 9.0
29	9°07.3	9°08.7	8°42.3	2.9 - 1.8	8.9 - 5.4	14.9 - 9.1
30	9°07.5	9°09.0	8°42.6	3.0 - 1.8	9.0 - 5.5	15.0 - 9.1
31	9°07.7	9°09.2	8°42.8	3.1 - 1.9	9.1 - 5.5	15.1 - 9.2
32	9°08.0	9°09.5	8°43.0	3.2 - 1.9	9.2 - 5.6	15.2 - 9.2
33	9°08.2	9°09.7	8°43.3	3.3 - 2.0	9.3 - 5.7	15.3 - 9.3
34	9°08.5	9°10.0	8°43.5	3.4 - 2.1	9.4 - 5.7	15.4 - 9.4
35	9°08.8	9°10.2	8°43.8	3.5 - 2.1	9.5 - 5.8	15.5 - 9.4
36	9°09.0	9°10.5	8°44.0	3.6 - 2.2	9.6 - 5.8	15.6 - 9.5
37	9°09.3	9°10.8	8°44.2	3.7 - 2.3	9.7 - 5.9	15.7 - 9.6
38	9°09.5	9°11.0	8°44.5	3.8 - 2.3	9.8 - 6.0	15.8 - 9.6
39	9°09.7	9°11.3	8°44.7	3.9 - 2.4	9.9 - 6.0	15.9 - 9.7
40	9°10.0	9°11.5	8°44.9	4.0 - 2.4	10.0 - 6.1	16.0 - 9.7
41	9°10.2	9°11.8	8°45.2	4.1 - 2.5	10.1 - 6.1	16.1 - 9.8
42	9°10.5	9°12.0	8°45.4	4.2 - 2.6	10.2 - 6.2	16.2 - 9.9
43	9°10.8	9°12.3	8°45.7	4.3 - 2.6	10.3 - 6.3	16.3 - 9.9
44	9°11.0	9°12.5	8°45.9	4.4 - 2.7	10.4 - 6.3	16.4 - 10.0
45	9°11.2	9°12.8	8°46.1	4.5 - 2.7	10.5 - 6.4	16.5 - 10.0
46	9°11.5	9°13.0	8°46.4	4.6 - 2.8	10.6 - 6.4	16.6 - 10.1
47	9°11.7	9°13.3	8°46.6	4.7 - 2.9	10.7 - 6.5	16.7 - 10.2
48	9°12.0	9°13.5	8°46.9	4.8 - 2.9	10.8 - 6.6	16.8 - 10.2
49	9°12.3	9°13.8	8°47.1	4.9 - 3.0	10.9 - 6.6	16.9 - 10.3
50	9°12.5	9°14.0	8°47.3	5.0 - 3.0	11.0 - 6.7	17.0 - 10.3
51	9°12.8	9°14.3	8°47.6	5.1 - 3.1	11.1 - 6.8	17.1 - 10.4
52	9°13.0	9°14.5	8°47.8	5.2 - 3.2	11.2 - 6.8	17.2 - 10.5
53	9°13.2	9°14.8	8°48.0	5.3 - 3.2	11.3 - 6.9	17.3 - 10.5
54	9°13.5	9°15.0	8°48.3	5.4 - 3.3	11.4 - 6.9	17.4 - 10.6
55	9°13.7	9°15.3	8°48.5	5.5 - 3.3	11.5 - 7.0	17.5 - 10.6
56	9°14.0	9°15.5	8°48.8	5.6 - 3.4	11.6 - 7.1	17.6 - 10.7
57	9°14.3	9°15.8	8°49.0	5.7 - 3.5	11.7 - 7.1	17.7 - 10.8
58	9°14.5	9°16.0	8°49.2	5.8 - 3.5	11.8 - 7.2	17.8 - 10.8
59	9°14.8	9°16.3	8°49.5	5.9 - 3.6	11.9 - 7.2	17.9 - 10.9

m 37	Sun Plan.	Aries	Moon	v and d corr		
0	9°15.0	9°16.5	8°49.7	0.0 - 0.0	6.0 - 3.8	12.0 - 7.5
1	9°15.2	9°16.8	8°50.0	0.1 - 0.1	6.1 - 3.8	12.1 - 7.6
2	9°15.5	9°17.0	8°50.2	0.2 - 0.1	6.2 - 3.9	12.2 - 7.6
3	9°15.7	9°17.3	8°50.4	0.3 - 0.2	6.3 - 3.9	12.3 - 7.7
4	9°16.0	9°17.5	8°50.7	0.4 - 0.3	6.4 - 4.0	12.4 - 7.8
5	9°16.3	9°17.8	8°50.9	0.5 - 0.3	6.5 - 4.1	12.5 - 7.8
6	9°16.5	9°18.0	8°51.1	0.6 - 0.4	6.6 - 4.1	12.6 - 7.9
7	9°16.8	9°18.3	8°51.4	0.7 - 0.4	6.7 - 4.2	12.7 - 7.9
8	9°17.0	9°18.5	8°51.6	0.8 - 0.5	6.8 - 4.3	12.8 - 8.0
9	9°17.2	9°18.8	8°51.9	0.9 - 0.6	6.9 - 4.3	12.9 - 8.1
10	9°17.5	9°19.0	8°52.1	1.0 - 0.6	7.0 - 4.4	13.0 - 8.1
11	9°17.7	9°19.3	8°52.3	1.1 - 0.7	7.1 - 4.4	13.1 - 8.2
12	9°18.0	9°19.5	8°52.6	1.2 - 0.8	7.2 - 4.5	13.2 - 8.3
13	9°18.3	9°19.8	8°52.8	1.3 - 0.8	7.3 - 4.6	13.3 - 8.3
14	9°18.5	9°20.0	8°53.1	1.4 - 0.9	7.4 - 4.6	13.4 - 8.4
15	9°18.8	9°20.3	8°53.3	1.5 - 0.9	7.5 - 4.7	13.5 - 8.4
16	9°19.0	9°20.5	8°53.5	1.6 - 1.0	7.6 - 4.8	13.6 - 8.5
17	9°19.2	9°20.8	8°53.8	1.7 - 1.1	7.7 - 4.8	13.7 - 8.6
18	9°19.5	9°21.0	8°54.0	1.8 - 1.1	7.8 - 4.9	13.8 - 8.6
19	9°19.8	9°21.3	8°54.3	1.9 - 1.2	7.9 - 4.9	13.9 - 8.7
20	9°20.0	9°21.5	8°54.5	2.0 - 1.3	8.0 - 5.0	14.0 - 8.8
21	9°20.3	9°21.8	8°54.7	2.1 - 1.3	8.1 - 5.1	14.1 - 8.8
22	9°20.5	9°22.0	8°55.0	2.2 - 1.4	8.2 - 5.1	14.2 - 8.9
23	9°20.7	9°22.3	8°55.2	2.3 - 1.4	8.3 - 5.2	14.3 - 8.9
24	9°21.0	9°22.5	8°55.4	2.4 - 1.5	8.4 - 5.3	14.4 - 9.0
25	9°21.2	9°22.8	8°55.7	2.5 - 1.6	8.5 - 5.3	14.5 - 9.1
26	9°21.5	9°23.0	8°55.9	2.6 - 1.6	8.6 - 5.4	14.6 - 9.1
27	9°21.8	9°23.3	8°56.2	2.7 - 1.7	8.7 - 5.4	14.7 - 9.2
28	9°22.0	9°23.5	8°56.4	2.8 - 1.8	8.8 - 5.5	14.8 - 9.3
29	9°22.3	9°23.8	8°56.6	2.9 - 1.8	8.9 - 5.6	14.9 - 9.3
30	9°22.5	9°24.0	8°56.9	3.0 - 1.9	9.0 - 5.6	15.0 - 9.4
31	9°22.7	9°24.3	8°57.1	3.1 - 1.9	9.1 - 5.7	15.1 - 9.4
32	9°23.0	9°24.5	8°57.4	3.2 - 2.0	9.2 - 5.8	15.2 - 9.5
33	9°23.2	9°24.8	8°57.6	3.3 - 2.1	9.3 - 5.8	15.3 - 9.6
34	9°23.5	9°25.0	8°57.8	3.4 - 2.1	9.4 - 5.9	15.4 - 9.6
35	9°23.8	9°25.3	8°58.1	3.5 - 2.2	9.5 - 5.9	15.5 - 9.7
36	9°24.0	9°25.5	8°58.3	3.6 - 2.3	9.6 - 6.0	15.6 - 9.8
37	9°24.3	9°25.8	8°58.5	3.7 - 2.3	9.7 - 6.1	15.7 - 9.8
38	9°24.5	9°26.0	8°58.8	3.8 - 2.4	9.8 - 6.1	15.8 - 9.9
39	9°24.7	9°26.3	8°59.0	3.9 - 2.4	9.9 - 6.2	15.9 - 9.9
40	9°25.0	9°26.5	8°59.3	4.0 - 2.5	10.0 - 6.3	16.0 - 10.0
41	9°25.2	9°26.8	8°59.5	4.1 - 2.6	10.1 - 6.3	16.1 - 10.1
42	9°25.5	9°27.0	8°59.7	4.2 - 2.6	10.2 - 6.4	16.2 - 10.1
43	9°25.8	9°27.3	8°60.0	4.3 - 2.7	10.3 - 6.4	16.3 - 10.2
44	9°26.0	9°27.5	9°00.2	4.4 - 2.8	10.4 - 6.5	16.4 - 10.3
45	9°26.2	9°27.8	9°00.5	4.5 - 2.8	10.5 - 6.6	16.5 - 10.3
46	9°26.5	9°28.0	9°00.7	4.6 - 2.9	10.6 - 6.6	16.6 - 10.4
47	9°26.7	9°28.3	9°00.9	4.7 - 2.9	10.7 - 6.7	16.7 - 10.4
48	9°27.0	9°28.5	9°01.2	4.8 - 3.0	10.8 - 6.8	16.8 - 10.5
49	9°27.3	9°28.8	9°01.4	4.9 - 3.1	10.9 - 6.8	16.9 - 10.6
50	9°27.5	9°29.1	9°01.6	5.0 - 3.1	11.0 - 6.9	17.0 - 10.6
51	9°27.8	9°29.3	9°01.9	5.1 - 3.2	11.1 - 6.9	17.1 - 10.7
52	9°28.0	9°29.6	9°02.1	5.2 - 3.3	11.2 - 7.0	17.2 - 10.8
53	9°28.2	9°29.8	9°02.4	5.3 - 3.3	11.3 - 7.1	17.3 - 10.8
54	9°28.5	9°30.1	9°02.6	5.4 - 3.4	11.4 - 7.1	17.4 - 10.9
55	9°28.7	9°30.3	9°02.8	5.5 - 3.4	11.5 - 7.2	17.5 - 10.9
56	9°29.0	9°30.6	9°03.1	5.6 - 3.5	11.6 - 7.3	17.6 - 11.0
57	9°29.3	9°30.8	9°03.3	5.7 - 3.6	11.7 - 7.3	17.7 - 11.1
58	9°29.5	9°31.1	9°03.6	5.8 - 3.6	11.8 - 7.4	17.8 - 11.1
59	9°29.8	9°31.3	9°03.8	5.9 - 3.7	11.9 - 7.4	17.9 - 11.2

m 38	Sun Plan.	Aries	Moon	v and d corr		
0	9°30.0	9°31.6	9°04.0	0.0 - 0.0	6.0 - 3.9	12.0 - 7.7
1	9°30.2	9°31.8	9°04.3	0.1 - 0.1	6.1 - 3.9	12.1 - 7.8
2	9°30.5	9°32.1	9°04.5	0.2 - 0.1	6.2 - 4.0	12.2 - 7.8
3	9°30.7	9°32.3	9°04.7	0.3 - 0.2	6.3 - 4.0	12.3 - 7.9
4	9°31.0	9°32.6	9°05.0	0.4 - 0.3	6.4 - 4.1	12.4 - 8.0
5	9°31.3	9°32.8	9°05.2	0.5 - 0.3	6.5 - 4.2	12.5 - 8.0
6	9°31.5	9°33.1	9°05.5	0.6 - 0.4	6.6 - 4.2	12.6 - 8.1
7	9°31.8	9°33.3	9°05.7	0.7 - 0.4	6.7 - 4.3	12.7 - 8.1
8	9°32.0	9°33.6	9°05.9	0.8 - 0.5	6.8 - 4.4	12.8 - 8.2
9	9°32.2	9°33.8	9°06.2	0.9 - 0.6	6.9 - 4.4	12.9 - 8.3
10	9°32.5	9°34.1	9°06.4	1.0 - 0.6	7.0 - 4.5	13.0 - 8.3
11	9°32.7	9°34.3	9°06.7	1.1 - 0.7	7.1 - 4.6	13.1 - 8.4
12	9°33.0	9°34.6	9°06.9	1.2 - 0.8	7.2 - 4.6	13.2 - 8.5
13	9°33.3	9°34.8	9°07.1	1.3 - 0.8	7.3 - 4.7	13.3 - 8.5
14	9°33.5	9°35.1	9°07.4	1.4 - 0.9	7.4 - 4.7	13.4 - 8.6
15	9°33.8	9°35.3	9°07.6	1.5 - 1.0	7.5 - 4.8	13.5 - 8.7
16	9°34.0	9°35.6	9°07.9	1.6 - 1.0	7.6 - 4.9	13.6 - 8.7
17	9°34.2	9°35.8	9°08.1	1.7 - 1.1	7.7 - 4.9	13.7 - 8.8
18	9°34.5	9°36.1	9°08.3	1.8 - 1.2	7.8 - 5.0	13.8 - 8.9
19	9°34.8	9°36.3	9°08.6	1.9 - 1.2	7.9 - 5.1	13.9 - 8.9
20	9°35.0	9°36.6	9°08.8	2.0 - 1.3	8.0 - 5.1	14.0 - 9.0
21	9°35.3	9°36.8	9°09.0	2.1 - 1.3	8.1 - 5.2	14.1 - 9.0
22	9°35.5	9°37.1	9°09.3	2.2 - 1.4	8.2 - 5.3	14.2 - 9.1
23	9°35.7	9°37.3	9°09.5	2.3 - 1.5	8.3 - 5.3	14.3 - 9.2
24	9°36.0	9°37.6	9°09.8	2.4 - 1.5	8.4 - 5.4	14.4 - 9.2
25	9°36.2	9°37.8	9°10.0	2.5 - 1.6	8.5 - 5.5	14.5 - 9.3
26	9°36.5	9°38.1	9°10.2	2.6 - 1.7	8.6 - 5.5	14.6 - 9.4
27	9°36.8	9°38.3	9°10.5	2.7 - 1.7	8.7 - 5.6	14.7 - 9.4
28	9°37.0	9°38.6	9°10.7	2.8 - 1.8	8.8 - 5.6	14.8 - 9.5
29	9°37.3	9°38.8	9°11.0	2.9 - 1.9	8.9 - 5.7	14.9 - 9.6
30	9°37.5	9°39.1	9°11.2	3.0 - 1.9	9.0 - 5.8	15.0 - 9.6
31	9°37.7	9°39.3	9°11.4	3.1 - 2.0	9.1 - 5.8	15.1 - 9.7
32	9°38.0	9°39.6	9°11.7	3.2 - 2.1	9.2 - 5.9	15.2 - 9.8
33	9°38.2	9°39.8	9°11.9	3.3 - 2.1	9.3 - 6.0	15.3 - 9.8
34	9°38.5	9°40.1	9°12.1	3.4 - 2.2	9.4 - 6.0	15.4 - 9.9
35	9°38.8	9°40.3	9°12.4	3.5 - 2.2	9.5 - 6.1	15.5 - 9.9
36	9°39.0	9°40.6	9°12.6	3.6 - 2.3	9.6 - 6.2	15.6 - 10.0
37	9°39.3	9°40.8	9°12.9	3.7 - 2.4	9.7 - 6.2	15.7 - 10.1
38	9°39.5	9°41.1	9°13.1	3.8 - 2.4	9.8 - 6.3	15.8 - 10.1
39	9°39.7	9°41.3	9°13.3	3.9 - 2.5	9.9 - 6.4	15.9 - 10.2
40	9°40.0	9°41.6	9°13.6	4.0 - 2.6	10.0 - 6.4	16.0 - 10.3
41	9°40.2	9°41.8	9°13.8	4.1 - 2.6	10.1 - 6.5	16.1 - 10.3
42	9°40.5	9°42.1	9°14.1	4.2 - 2.7	10.2 - 6.5	16.2 - 10.4
43	9°40.8	9°42.3	9°14.3	4.3 - 2.8	10.3 - 6.6	16.3 - 10.5
44	9°41.0	9°42.6	9°14.5	4.4 - 2.8	10.4 - 6.7	16.4 - 10.5
45	9°41.2	9°42.8	9°14.8	4.5 - 2.9	10.5 - 6.7	16.5 - 10.6
46	9°41.5	9°43.1	9°15.0	4.6 - 3.0	10.6 - 6.8	16.6 - 10.7
47	9°41.7	9°43.3	9°15.2	4.7 - 3.0	10.7 - 6.9	16.7 - 10.7
48	9°42.0	9°43.6	9°15.5	4.8 - 3.1	10.8 - 6.9	16.8 - 10.8
49	9°42.3	9°43.8	9°15.7	4.9 - 3.1	10.9 - 7.0	16.9 - 10.8
50	9°42.5	9°44.1	9°16.0	5.0 - 3.2	11.0 - 7.1	17.0 - 10.9
51	9°42.8	9°44.3	9°16.2	5.1 - 3.3	11.1 - 7.1	17.1 - 11.0
52	9°43.0	9°44.6	9°16.4	5.2 - 3.3	11.2 - 7.2	17.2 - 11.0
53	9°43.2	9°44.8	9°16.7	5.3 - 3.4	11.3 - 7.3	17.3 - 11.1
54	9°43.5	9°45.1	9°16.9	5.4 - 3.5	11.4 - 7.3	17.4 - 11.2
55	9°43.7	9°45.3	9°17.2	5.5 - 3.5	11.5 - 7.4	17.5 - 11.2
56	9°44.0	9°45.6	9°17.4	5.6 - 3.6	11.6 - 7.4	17.6 - 11.3
57	9°44.3	9°45.8	9°17.6	5.7 - 3.7	11.7 - 7.5	17.7 - 11.4
58	9°44.5	9°46.1	9°17.9	5.8 - 3.7	11.8 - 7.6	17.8 - 11.4
59	9°44.8	9°46.3	9°18.1	5.9 - 3.8	11.9 - 7.6	17.9 - 11.5

Increments and Corrections

m 39	Sun Plan.	Aries	Moon	v and d corr		
0	9°45.0	9°46.6	9°18.4	0.0 - 0.0	6.0 - 4.0	12.0 - 7.9
1	9°45.2	9°46.8	9°18.6	0.1 - 0.1	6.1 - 4.0	12.1 - 8.0
2	9°45.5	9°47.1	9°18.8	0.2 - 0.1	6.2 - 4.1	12.2 - 8.0
3	9°45.7	9°47.4	9°19.1	0.3 - 0.2	6.3 - 4.1	12.3 - 8.1
4	9°46.0	9°47.6	9°19.3	0.4 - 0.3	6.4 - 4.2	12.4 - 8.2
5	9°46.3	9°47.9	9°19.5	0.5 - 0.3	6.5 - 4.3	12.5 - 8.2
6	9°46.5	9°48.1	9°19.8	0.6 - 0.4	6.6 - 4.3	12.6 - 8.3
7	9°46.8	9°48.4	9°20.0	0.7 - 0.5	6.7 - 4.4	12.7 - 8.4
8	9°47.0	9°48.6	9°20.3	0.8 - 0.5	6.8 - 4.5	12.8 - 8.4
9	9°47.2	9°48.9	9°20.5	0.9 - 0.6	6.9 - 4.5	12.9 - 8.5
10	9°47.5	9°49.1	9°20.7	1.0 - 0.7	7.0 - 4.6	13.0 - 8.6
11	9°47.7	9°49.4	9°21.0	1.1 - 0.7	7.1 - 4.7	13.1 - 8.6
12	9°48.0	9°49.6	9°21.2	1.2 - 0.8	7.2 - 4.7	13.2 - 8.7
13	9°48.3	9°49.9	9°21.5	1.3 - 0.9	7.3 - 4.8	13.3 - 8.8
14	9°48.5	9°50.1	9°21.7	1.4 - 0.9	7.4 - 4.9	13.4 - 8.8
15	9°48.8	9°50.4	9°21.9	1.5 - 1.0	7.5 - 4.9	13.5 - 8.9
16	9°49.0	9°50.6	9°22.2	1.6 - 1.1	7.6 - 5.0	13.6 - 9.0
17	9°49.2	9°50.9	9°22.4	1.7 - 1.1	7.7 - 5.1	13.7 - 9.0
18	9°49.5	9°51.1	9°22.6	1.8 - 1.2	7.8 - 5.1	13.8 - 9.1
19	9°49.8	9°51.4	9°22.9	1.9 - 1.3	7.9 - 5.2	13.9 - 9.2
20	9°50.0	9°51.6	9°23.1	2.0 - 1.3	8.0 - 5.3	14.0 - 9.2
21	9°50.3	9°51.9	9°23.4	2.1 - 1.4	8.1 - 5.3	14.1 - 9.3
22	9°50.5	9°52.1	9°23.6	2.2 - 1.4	8.2 - 5.4	14.2 - 9.3
23	9°50.7	9°52.4	9°23.8	2.3 - 1.5	8.3 - 5.5	14.3 - 9.4
24	9°51.0	9°52.6	9°24.1	2.4 - 1.6	8.4 - 5.5	14.4 - 9.5
25	9°51.2	9°52.9	9°24.3	2.5 - 1.6	8.5 - 5.6	14.5 - 9.5
26	9°51.5	9°53.1	9°24.6	2.6 - 1.7	8.6 - 5.7	14.6 - 9.6
27	9°51.8	9°53.4	9°24.8	2.7 - 1.8	8.7 - 5.7	14.7 - 9.7
28	9°52.0	9°53.6	9°25.0	2.8 - 1.8	8.8 - 5.8	14.8 - 9.7
29	9°52.3	9°53.9	9°25.3	2.9 - 1.9	8.9 - 5.9	14.9 - 9.8
30	9°52.5	9°54.1	9°25.5	3.0 - 2.0	9.0 - 5.9	15.0 - 9.9
31	9°52.7	9°54.4	9°25.7	3.1 - 2.0	9.1 - 6.0	15.1 - 9.9
32	9°53.0	9°54.6	9°26.0	3.2 - 2.1	9.2 - 6.1	15.2 - 10.0
33	9°53.2	9°54.9	9°26.2	3.3 - 2.2	9.3 - 6.1	15.3 - 10.1
34	9°53.5	9°55.1	9°26.5	3.4 - 2.2	9.4 - 6.2	15.4 - 10.1
35	9°53.8	9°55.4	9°26.7	3.5 - 2.3	9.5 - 6.3	15.5 - 10.2
36	9°54.0	9°55.6	9°26.9	3.6 - 2.4	9.6 - 6.3	15.6 - 10.3
37	9°54.3	9°55.9	9°27.2	3.7 - 2.4	9.7 - 6.4	15.7 - 10.3
38	9°54.5	9°56.1	9°27.4	3.8 - 2.5	9.8 - 6.5	15.8 - 10.4
39	9°54.7	9°56.4	9°27.7	3.9 - 2.6	9.9 - 6.5	15.9 - 10.5
40	9°55.0	9°56.6	9°27.9	4.0 - 2.6	10.0 - 6.6	16.0 - 10.5
41	9°55.2	9°56.9	9°28.1	4.1 - 2.7	10.1 - 6.6	16.1 - 10.6
42	9°55.5	9°57.1	9°28.4	4.2 - 2.8	10.2 - 6.7	16.2 - 10.7
43	9°55.8	9°57.4	9°28.6	4.3 - 2.8	10.3 - 6.8	16.3 - 10.7
44	9°56.0	9°57.6	9°28.8	4.4 - 2.9	10.4 - 6.8	16.4 - 10.8
45	9°56.2	9°57.9	9°29.1	4.5 - 3.0	10.5 - 6.9	16.5 - 10.9
46	9°56.5	9°58.1	9°29.3	4.6 - 3.0	10.6 - 7.0	16.6 - 10.9
47	9°56.7	9°58.4	9°29.6	4.7 - 3.1	10.7 - 7.0	16.7 - 11.0
48	9°57.0	9°58.6	9°29.8	4.8 - 3.2	10.8 - 7.1	16.8 - 11.1
49	9°57.3	9°58.9	9°30.0	4.9 - 3.2	10.9 - 7.2	16.9 - 11.1
50	9°57.5	9°59.1	9°30.3	5.0 - 3.3	11.0 - 7.2	17.0 - 11.2
51	9°57.8	9°59.4	9°30.5	5.1 - 3.4	11.1 - 7.3	17.1 - 11.3
52	9°58.0	9°59.6	9°30.8	5.2 - 3.4	11.2 - 7.4	17.2 - 11.3
53	9°58.2	9°59.9	9°31.0	5.3 - 3.5	11.3 - 7.4	17.3 - 11.4
54	9°58.5	10°00.1	9°31.2	5.4 - 3.6	11.4 - 7.5	17.4 - 11.5
55	9°58.7	10°00.4	9°31.5	5.5 - 3.6	11.5 - 7.6	17.5 - 11.5
56	9°59.0	10°00.6	9°31.7	5.6 - 3.7	11.6 - 7.6	17.6 - 11.6
57	9°59.3	10°00.9	9°32.0	5.7 - 3.8	11.7 - 7.7	17.7 - 11.7
58	9°59.5	10°01.1	9°32.2	5.8 - 3.8	11.8 - 7.8	17.8 - 11.7
59	9°59.8	10°01.4	9°32.4	5.9 - 3.9	11.9 - 7.8	17.9 - 11.8

m 40	Sun Plan.	Aries	Moon	v and d corr		
0	10°00.0	10°01.6	9°32.7	0.0 - 0.0	6.0 - 4.1	12.0 - 8.1
1	10°00.2	10°01.9	9°32.9	0.1 - 0.1	6.1 - 4.1	12.1 - 8.2
2	10°00.5	10°02.1	9°33.1	0.2 - 0.1	6.2 - 4.2	12.2 - 8.2
3	10°00.7	10°02.4	9°33.4	0.3 - 0.2	6.3 - 4.3	12.3 - 8.3
4	10°01.0	10°02.6	9°33.6	0.4 - 0.3	6.4 - 4.3	12.4 - 8.4
5	10°01.3	10°02.9	9°33.9	0.5 - 0.3	6.5 - 4.4	12.5 - 8.4
6	10°01.5	10°03.1	9°34.1	0.6 - 0.4	6.6 - 4.5	12.6 - 8.5
7	10°01.8	10°03.4	9°34.3	0.7 - 0.5	6.7 - 4.5	12.7 - 8.6
8	10°02.0	10°03.6	9°34.6	0.8 - 0.5	6.8 - 4.6	12.8 - 8.6
9	10°02.2	10°03.9	9°34.8	0.9 - 0.6	6.9 - 4.7	12.9 - 8.7
10	10°02.5	10°04.1	9°35.1	1.0 - 0.7	7.0 - 4.7	13.0 - 8.8
11	10°02.7	10°04.4	9°35.3	1.1 - 0.7	7.1 - 4.8	13.1 - 8.8
12	10°03.0	10°04.6	9°35.5	1.2 - 0.8	7.2 - 4.9	13.2 - 8.9
13	10°03.3	10°04.9	9°35.8	1.3 - 0.9	7.3 - 4.9	13.3 - 9.0
14	10°03.5	10°05.1	9°36.0	1.4 - 0.9	7.4 - 5.0	13.4 - 9.0
15	10°03.8	10°05.4	9°36.2	1.5 - 1.0	7.5 - 5.1	13.5 - 9.1
16	10°04.0	10°05.7	9°36.5	1.6 - 1.1	7.6 - 5.1	13.6 - 9.2
17	10°04.2	10°05.9	9°36.7	1.7 - 1.1	7.7 - 5.2	13.7 - 9.2
18	10°04.5	10°06.2	9°37.0	1.8 - 1.2	7.8 - 5.3	13.8 - 9.3
19	10°04.8	10°06.4	9°37.2	1.9 - 1.3	7.9 - 5.3	13.9 - 9.4
20	10°05.0	10°06.7	9°37.4	2.0 - 1.4	8.0 - 5.4	14.0 - 9.5
21	10°05.3	10°06.9	9°37.7	2.1 - 1.4	8.1 - 5.5	14.1 - 9.5
22	10°05.5	10°07.2	9°37.9	2.2 - 1.5	8.2 - 5.5	14.2 - 9.6
23	10°05.7	10°07.4	9°38.2	2.3 - 1.6	8.3 - 5.6	14.3 - 9.7
24	10°06.0	10°07.7	9°38.4	2.4 - 1.6	8.4 - 5.7	14.4 - 9.7
25	10°06.2	10°07.9	9°38.6	2.5 - 1.7	8.5 - 5.7	14.5 - 9.8
26	10°06.5	10°08.2	9°38.9	2.6 - 1.8	8.6 - 5.8	14.6 - 9.9
27	10°06.8	10°08.4	9°39.1	2.7 - 1.8	8.7 - 5.9	14.7 - 9.9
28	10°07.0	10°08.7	9°39.3	2.8 - 1.9	8.8 - 5.9	14.8 - 10.0
29	10°07.3	10°08.9	9°39.6	2.9 - 2.0	8.9 - 6.0	14.9 - 10.1
30	10°07.5	10°09.2	9°39.8	3.0 - 2.0	9.0 - 6.1	15.0 - 10.1
31	10°07.7	10°09.4	9°40.1	3.1 - 2.1	9.1 - 6.1	15.1 - 10.2
32	10°08.0	10°09.7	9°40.3	3.2 - 2.2	9.2 - 6.2	15.2 - 10.3
33	10°08.2	10°09.9	9°40.5	3.3 - 2.2	9.3 - 6.3	15.3 - 10.3
34	10°08.5	10°10.2	9°40.8	3.4 - 2.3	9.4 - 6.3	15.4 - 10.4
35	10°08.8	10°10.4	9°41.0	3.5 - 2.4	9.5 - 6.4	15.5 - 10.5
36	10°09.0	10°10.7	9°41.3	3.6 - 2.4	9.6 - 6.5	15.6 - 10.5
37	10°09.3	10°10.9	9°41.5	3.7 - 2.5	9.7 - 6.5	15.7 - 10.6
38	10°09.5	10°11.2	9°41.7	3.8 - 2.6	9.8 - 6.6	15.8 - 10.7
39	10°09.7	10°11.4	9°42.0	3.9 - 2.6	9.9 - 6.7	15.9 - 10.7
40	10°10.0	10°11.7	9°42.2	4.0 - 2.7	10.0 - 6.8	16.0 - 10.8
41	10°10.2	10°11.9	9°42.4	4.1 - 2.8	10.1 - 6.8	16.1 - 10.9
42	10°10.5	10°12.2	9°42.7	4.2 - 2.8	10.2 - 6.9	16.2 - 10.9
43	10°10.8	10°12.4	9°42.9	4.3 - 2.9	10.3 - 7.0	16.3 - 11.0
44	10°11.0	10°12.7	9°43.2	4.4 - 3.0	10.4 - 7.0	16.4 - 11.1
45	10°11.2	10°12.9	9°43.4	4.5 - 3.0	10.5 - 7.1	16.5 - 11.1
46	10°11.5	10°13.2	9°43.6	4.6 - 3.1	10.6 - 7.2	16.6 - 11.2
47	10°11.7	10°13.4	9°43.9	4.7 - 3.2	10.7 - 7.2	16.7 - 11.3
48	10°12.0	10°13.7	9°44.1	4.8 - 3.2	10.8 - 7.3	16.8 - 11.3
49	10°12.3	10°13.9	9°44.4	4.9 - 3.3	10.9 - 7.4	16.9 - 11.4
50	10°12.5	10°14.2	9°44.6	5.0 - 3.4	11.0 - 7.4	17.0 - 11.5
51	10°12.8	10°14.4	9°44.8	5.1 - 3.4	11.1 - 7.5	17.1 - 11.5
52	10°13.0	10°14.7	9°45.1	5.2 - 3.5	11.2 - 7.6	17.2 - 11.6
53	10°13.2	10°14.9	9°45.3	5.3 - 3.6	11.3 - 7.6	17.3 - 11.7
54	10°13.5	10°15.2	9°45.6	5.4 - 3.6	11.4 - 7.7	17.4 - 11.7
55	10°13.7	10°15.4	9°45.8	5.5 - 3.7	11.5 - 7.8	17.5 - 11.8
56	10°14.0	10°15.7	9°46.0	5.6 - 3.8	11.6 - 7.8	17.6 - 11.9
57	10°14.3	10°15.9	9°46.3	5.7 - 3.8	11.7 - 7.9	17.7 - 11.9
58	10°14.5	10°16.2	9°46.5	5.8 - 3.9	11.8 - 8.0	17.8 - 12.0
59	10°14.8	10°16.4	9°46.7	5.9 - 4.0	11.9 - 8.0	17.9 - 12.1

m 41	Sun Plan.	Aries	Moon	v and d corr		
0	10°15.0	10°16.7	9°47.0	0.0 - 0.0	6.0 - 4.2	12.0 - 8.3
1	10°15.2	10°16.9	9°47.2	0.1 - 0.1	6.1 - 4.2	12.1 - 8.4
2	10°15.5	10°17.2	9°47.5	0.2 - 0.1	6.2 - 4.3	12.2 - 8.4
3	10°15.7	10°17.4	9°47.7	0.3 - 0.2	6.3 - 4.4	12.3 - 8.5
4	10°16.0	10°17.7	9°47.9	0.4 - 0.3	6.4 - 4.4	12.4 - 8.6
5	10°16.3	10°17.9	9°48.2	0.5 - 0.3	6.5 - 4.5	12.5 - 8.6
6	10°16.5	10°18.2	9°48.4	0.6 - 0.4	6.6 - 4.6	12.6 - 8.7
7	10°16.8	10°18.4	9°48.7	0.7 - 0.5	6.7 - 4.6	12.7 - 8.8
8	10°17.0	10°18.7	9°48.9	0.8 - 0.6	6.8 - 4.7	12.8 - 8.9
9	10°17.2	10°18.9	9°49.1	0.9 - 0.6	6.9 - 4.8	12.9 - 8.9
10	10°17.5	10°19.2	9°49.4	1.0 - 0.7	7.0 - 4.8	13.0 - 9.0
11	10°17.7	10°19.4	9°49.6	1.1 - 0.8	7.1 - 4.9	13.1 - 9.1
12	10°18.0	10°19.7	9°49.8	1.2 - 0.8	7.2 - 5.0	13.2 - 9.1
13	10°18.3	10°19.9	9°50.1	1.3 - 0.9	7.3 - 5.0	13.3 - 9.2
14	10°18.5	10°20.2	9°50.3	1.4 - 1.0	7.4 - 5.1	13.4 - 9.3
15	10°18.8	10°20.4	9°50.6	1.5 - 1.0	7.5 - 5.2	13.5 - 9.3
16	10°19.0	10°20.7	9°50.8	1.6 - 1.1	7.6 - 5.3	13.6 - 9.4
17	10°19.2	10°20.9	9°51.0	1.7 - 1.2	7.7 - 5.3	13.7 - 9.5
18	10°19.5	10°21.2	9°51.3	1.8 - 1.2	7.8 - 5.4	13.8 - 9.5
19	10°19.8	10°21.4	9°51.5	1.9 - 1.3	7.9 - 5.5	13.9 - 9.6
20	10°20.0	10°21.7	9°51.8	2.0 - 1.4	8.0 - 5.5	14.0 - 9.7
21	10°20.3	10°21.9	9°52.0	2.1 - 1.5	8.1 - 5.6	14.1 - 9.8
22	10°20.5	10°22.2	9°52.2	2.2 - 1.5	8.2 - 5.7	14.2 - 9.8
23	10°20.7	10°22.4	9°52.5	2.3 - 1.6	8.3 - 5.7	14.3 - 9.9
24	10°21.0	10°22.7	9°52.7	2.4 - 1.7	8.4 - 5.8	14.4 - 10.0
25	10°21.2	10°22.9	9°52.9	2.5 - 1.7	8.5 - 5.9	14.5 - 10.0
26	10°21.5	10°23.2	9°53.2	2.6 - 1.8	8.6 - 5.9	14.6 - 10.1
27	10°21.8	10°23.4	9°53.4	2.7 - 1.9	8.7 - 6.0	14.7 - 10.2
28	10°22.0	10°23.7	9°53.7	2.8 - 1.9	8.8 - 6.1	14.8 - 10.2
29	10°22.3	10°24.0	9°53.9	2.9 - 2.0	8.9 - 6.2	14.9 - 10.3
30	10°22.5	10°24.2	9°54.1	3.0 - 2.1	9.0 - 6.2	15.0 - 10.4
31	10°22.7	10°24.5	9°54.4	3.1 - 2.1	9.1 - 6.3	15.1 - 10.4
32	10°23.0	10°24.7	9°54.6	3.2 - 2.2	9.2 - 6.4	15.2 - 10.5
33	10°23.2	10°25.0	9°54.9	3.3 - 2.3	9.3 - 6.4	15.3 - 10.6
34	10°23.5	10°25.2	9°55.1	3.4 - 2.4	9.4 - 6.5	15.4 - 10.7
35	10°23.8	10°25.5	9°55.3	3.5 - 2.4	9.5 - 6.6	15.5 - 10.7
36	10°24.0	10°25.7	9°55.6	3.6 - 2.5	9.6 - 6.6	15.6 - 10.8
37	10°24.3	10°26.0	9°55.8	3.7 - 2.6	9.7 - 6.7	15.7 - 10.9
38	10°24.5	10°26.2	9°56.1	3.8 - 2.6	9.8 - 6.8	15.8 - 10.9
39	10°24.7	10°26.5	9°56.3	3.9 - 2.7	9.9 - 6.8	15.9 - 11.0
40	10°25.0	10°26.7	9°56.5	4.0 - 2.8	10.0 - 6.9	16.0 - 11.1
41	10°25.2	10°27.0	9°56.8	4.1 - 2.8	10.1 - 7.0	16.1 - 11.1
42	10°25.5	10°27.2	9°57.0	4.2 - 2.9	10.2 - 7.1	16.2 - 11.2
43	10°25.8	10°27.5	9°57.2	4.3 - 3.0	10.3 - 7.1	16.3 - 11.3
44	10°26.0	10°27.7	9°57.5	4.4 - 3.0	10.4 - 7.2	16.4 - 11.3
45	10°26.2	10°28.0	9°57.7	4.5 - 3.1	10.5 - 7.3	16.5 - 11.4
46	10°26.5	10°28.2	9°58.0	4.6 - 3.2	10.6 - 7.3	16.6 - 11.5
47	10°26.7	10°28.5	9°58.2	4.7 - 3.3	10.7 - 7.4	16.7 - 11.6
48	10°27.0	10°28.7	9°58.4	4.8 - 3.3	10.8 - 7.5	16.8 - 11.6
49	10°27.3	10°29.0	9°58.7	4.9 - 3.4	10.9 - 7.5	16.9 - 11.7
50	10°27.5	10°29.2	9°58.9	5.0 - 3.5	11.0 - 7.6	17.0 - 11.8
51	10°27.8	10°29.5	9°59.2	5.1 - 3.5	11.1 - 7.7	17.1 - 11.8
52	10°28.0	10°29.7	9°59.4	5.2 - 3.6	11.2 - 7.7	17.2 - 11.9
53	10°28.2	10°30.0	9°59.6	5.3 - 3.7	11.3 - 7.8	17.3 - 12.0
54	10°28.5	10°30.2	9°59.9	5.4 - 3.7	11.4 - 7.9	17.4 - 12.0
55	10°28.7	10°30.5	10°00.1	5.5 - 3.8	11.5 - 8.0	17.5 - 12.1
56	10°29.0	10°30.7	10°00.3	5.6 - 3.9	11.6 - 8.0	17.6 - 12.2
57	10°29.3	10°31.0	10°00.6	5.7 - 3.9	11.7 - 8.1	17.7 - 12.2
58	10°29.5	10°31.2	10°00.8	5.8 - 4.0	11.8 - 8.2	17.8 - 12.3
59	10°29.8	10°31.5	10°01.1	5.9 - 4.1	11.9 - 8.2	17.9 - 12.4

Increments and Corrections

m 42	Sun Plan.	Aries	Moon	v and d corr		
0	10°30.0	10°31.7	10°01.3	0.0 - 0.0	6.0 - 4.3	12.0 - 8.5
1	10°30.2	10°32.0	10°01.5	0.1 - 0.1	6.1 - 4.3	12.1 - 8.6
2	10°30.5	10°32.2	10°01.8	0.2 - 0.1	6.2 - 4.4	12.2 - 8.6
3	10°30.7	10°32.5	10°02.0	0.3 - 0.2	6.3 - 4.5	12.3 - 8.7
4	10°31.0	10°32.7	10°02.3	0.4 - 0.3	6.4 - 4.5	12.4 - 8.8
5	10°31.3	10°33.0	10°02.5	0.5 - 0.4	6.5 - 4.6	12.5 - 8.9
6	10°31.5	10°33.2	10°02.7	0.6 - 0.4	6.6 - 4.7	12.6 - 8.9
7	10°31.8	10°33.5	10°03.0	0.7 - 0.5	6.7 - 4.7	12.7 - 9.0
8	10°32.0	10°33.7	10°03.2	0.8 - 0.6	6.8 - 4.8	12.8 - 9.1
9	10°32.2	10°34.0	10°03.4	0.9 - 0.6	6.9 - 4.9	12.9 - 9.1
10	10°32.5	10°34.2	10°03.7	1.0 - 0.7	7.0 - 5.0	13.0 - 9.2
11	10°32.7	10°34.5	10°03.9	1.1 - 0.8	7.1 - 5.0	13.1 - 9.3
12	10°33.0	10°34.7	10°04.2	1.2 - 0.9	7.2 - 5.1	13.2 - 9.4
13	10°33.3	10°35.0	10°04.4	1.3 - 0.9	7.3 - 5.2	13.3 - 9.4
14	10°33.5	10°35.2	10°04.6	1.4 - 1.0	7.4 - 5.2	13.4 - 9.5
15	10°33.8	10°35.5	10°04.9	1.5 - 1.1	7.5 - 5.3	13.5 - 9.6
16	10°34.0	10°35.7	10°05.1	1.6 - 1.1	7.6 - 5.4	13.6 - 9.6
17	10°34.2	10°36.0	10°05.4	1.7 - 1.2	7.7 - 5.5	13.7 - 9.7
18	10°34.5	10°36.2	10°05.6	1.8 - 1.3	7.8 - 5.5	13.8 - 9.8
19	10°34.8	10°36.5	10°05.8	1.9 - 1.3	7.9 - 5.6	13.9 - 9.8
20	10°35.0	10°36.7	10°06.1	2.0 - 1.4	8.0 - 5.7	14.0 - 9.9
21	10°35.3	10°37.0	10°06.3	2.1 - 1.5	8.1 - 5.7	14.1 - 10.0
22	10°35.5	10°37.2	10°06.5	2.2 - 1.6	8.2 - 5.8	14.2 - 10.1
23	10°35.7	10°37.5	10°06.8	2.3 - 1.6	8.3 - 5.9	14.3 - 10.1
24	10°36.0	10°37.7	10°07.0	2.4 - 1.7	8.4 - 6.0	14.4 - 10.2
25	10°36.2	10°38.0	10°07.3	2.5 - 1.8	8.5 - 6.0	14.5 - 10.3
26	10°36.5	10°38.2	10°07.5	2.6 - 1.8	8.6 - 6.1	14.6 - 10.3
27	10°36.8	10°38.5	10°07.7	2.7 - 1.9	8.7 - 6.2	14.7 - 10.4
28	10°37.0	10°38.7	10°08.0	2.8 - 2.0	8.8 - 6.2	14.8 - 10.5
29	10°37.3	10°39.0	10°08.2	2.9 - 2.1	8.9 - 6.3	14.9 - 10.6
30	10°37.5	10°39.2	10°08.5	3.0 - 2.1	9.0 - 6.4	15.0 - 10.6
31	10°37.7	10°39.5	10°08.7	3.1 - 2.2	9.1 - 6.4	15.1 - 10.7
32	10°38.0	10°39.7	10°08.9	3.2 - 2.3	9.2 - 6.5	15.2 - 10.8
33	10°38.2	10°40.0	10°09.2	3.3 - 2.3	9.3 - 6.6	15.3 - 10.8
34	10°38.5	10°40.2	10°09.4	3.4 - 2.4	9.4 - 6.7	15.4 - 10.9
35	10°38.8	10°40.5	10°09.7	3.5 - 2.5	9.5 - 6.7	15.5 - 11.0
36	10°39.0	10°40.7	10°09.9	3.6 - 2.6	9.6 - 6.8	15.6 - 11.1
37	10°39.3	10°41.0	10°10.1	3.7 - 2.6	9.7 - 6.9	15.7 - 11.1
38	10°39.5	10°41.2	10°10.4	3.8 - 2.7	9.8 - 6.9	15.8 - 11.2
39	10°39.7	10°41.5	10°10.6	3.9 - 2.8	9.9 - 7.0	15.9 - 11.3
40	10°40.0	10°41.7	10°10.8	4.0 - 2.8	10.0 - 7.1	16.0 - 11.3
41	10°40.2	10°42.0	10°11.1	4.1 - 2.9	10.1 - 7.2	16.1 - 11.4
42	10°40.5	10°42.3	10°11.3	4.2 - 3.0	10.2 - 7.2	16.2 - 11.5
43	10°40.8	10°42.5	10°11.6	4.3 - 3.0	10.3 - 7.3	16.3 - 11.5
44	10°41.0	10°42.8	10°11.8	4.4 - 3.1	10.4 - 7.4	16.4 - 11.6
45	10°41.2	10°43.0	10°12.0	4.5 - 3.2	10.5 - 7.4	16.5 - 11.7
46	10°41.5	10°43.3	10°12.3	4.6 - 3.3	10.6 - 7.5	16.6 - 11.8
47	10°41.7	10°43.5	10°12.5	4.7 - 3.3	10.7 - 7.6	16.7 - 11.8
48	10°42.0	10°43.8	10°12.8	4.8 - 3.4	10.8 - 7.7	16.8 - 11.9
49	10°42.3	10°44.0	10°13.0	4.9 - 3.5	10.9 - 7.7	16.9 - 12.0
50	10°42.5	10°44.3	10°13.2	5.0 - 3.5	11.0 - 7.8	17.0 - 12.0
51	10°42.8	10°44.5	10°13.5	5.1 - 3.6	11.1 - 7.9	17.1 - 12.1
52	10°43.0	10°44.8	10°13.7	5.2 - 3.7	11.2 - 7.9	17.2 - 12.2
53	10°43.2	10°45.0	10°13.9	5.3 - 3.8	11.3 - 8.0	17.3 - 12.3
54	10°43.5	10°45.3	10°14.2	5.4 - 3.8	11.4 - 8.1	17.4 - 12.3
55	10°43.7	10°45.5	10°14.4	5.5 - 3.9	11.5 - 8.1	17.5 - 12.4
56	10°44.0	10°45.8	10°14.7	5.6 - 4.0	11.6 - 8.2	17.6 - 12.5
57	10°44.3	10°46.0	10°14.9	5.7 - 4.0	11.7 - 8.3	17.7 - 12.5
58	10°44.5	10°46.3	10°15.1	5.8 - 4.1	11.8 - 8.4	17.8 - 12.6
59	10°44.8	10°46.5	10°15.4	5.9 - 4.2	11.9 - 8.4	17.9 - 12.7

m 43	Sun Plan.	Aries	Moon	v and d corr		
0	10°45.0	10°46.8	10°15.6	0.0 - 0.0	6.0 - 4.4	12.0 - 8.7
1	10°45.2	10°47.0	10°15.9	0.1 - 0.1	6.1 - 4.4	12.1 - 8.8
2	10°45.5	10°47.3	10°16.1	0.2 - 0.1	6.2 - 4.5	12.2 - 8.8
3	10°45.7	10°47.5	10°16.3	0.3 - 0.2	6.3 - 4.6	12.3 - 8.9
4	10°46.0	10°47.8	10°16.6	0.4 - 0.3	6.4 - 4.6	12.4 - 9.0
5	10°46.3	10°48.0	10°16.8	0.5 - 0.4	6.5 - 4.7	12.5 - 9.1
6	10°46.5	10°48.3	10°17.0	0.6 - 0.4	6.6 - 4.8	12.6 - 9.1
7	10°46.8	10°48.5	10°17.3	0.7 - 0.5	6.7 - 4.9	12.7 - 9.2
8	10°47.0	10°48.8	10°17.5	0.8 - 0.6	6.8 - 4.9	12.8 - 9.3
9	10°47.2	10°49.0	10°17.8	0.9 - 0.7	6.9 - 5.0	12.9 - 9.4
10	10°47.5	10°49.3	10°18.0	1.0 - 0.7	7.0 - 5.1	13.0 - 9.4
11	10°47.7	10°49.5	10°18.2	1.1 - 0.8	7.1 - 5.1	13.1 - 9.5
12	10°48.0	10°49.8	10°18.5	1.2 - 0.9	7.2 - 5.2	13.2 - 9.6
13	10°48.3	10°50.0	10°18.7	1.3 - 0.9	7.3 - 5.3	13.3 - 9.6
14	10°48.5	10°50.3	10°19.0	1.4 - 1.0	7.4 - 5.4	13.4 - 9.7
15	10°48.8	10°50.5	10°19.2	1.5 - 1.1	7.5 - 5.4	13.5 - 9.8
16	10°49.0	10°50.8	10°19.4	1.6 - 1.2	7.6 - 5.5	13.6 - 9.9
17	10°49.2	10°51.0	10°19.7	1.7 - 1.2	7.7 - 5.6	13.7 - 9.9
18	10°49.5	10°51.3	10°19.9	1.8 - 1.3	7.8 - 5.7	13.8 - 10.0
19	10°49.8	10°51.5	10°20.2	1.9 - 1.4	7.9 - 5.7	13.9 - 10.1
20	10°50.0	10°51.8	10°20.4	2.0 - 1.5	8.0 - 5.8	14.0 - 10.2
21	10°50.3	10°52.0	10°20.6	2.1 - 1.5	8.1 - 5.9	14.1 - 10.2
22	10°50.5	10°52.3	10°20.9	2.2 - 1.6	8.2 - 5.9	14.2 - 10.3
23	10°50.7	10°52.5	10°21.1	2.3 - 1.7	8.3 - 6.0	14.3 - 10.4
24	10°51.0	10°52.8	10°21.3	2.4 - 1.7	8.4 - 6.1	14.4 - 10.4
25	10°51.2	10°53.0	10°21.6	2.5 - 1.8	8.5 - 6.2	14.5 - 10.5
26	10°51.5	10°53.3	10°21.8	2.6 - 1.9	8.6 - 6.2	14.6 - 10.6
27	10°51.8	10°53.5	10°22.1	2.7 - 2.0	8.7 - 6.3	14.7 - 10.7
28	10°52.0	10°53.8	10°22.3	2.8 - 2.0	8.8 - 6.4	14.8 - 10.7
29	10°52.3	10°54.0	10°22.5	2.9 - 2.1	8.9 - 6.5	14.9 - 10.8
30	10°52.5	10°54.3	10°22.8	3.0 - 2.2	9.0 - 6.5	15.0 - 10.9
31	10°52.7	10°54.5	10°23.0	3.1 - 2.2	9.1 - 6.6	15.1 - 10.9
32	10°53.0	10°54.8	10°23.3	3.2 - 2.3	9.2 - 6.7	15.2 - 11.0
33	10°53.2	10°55.0	10°23.5	3.3 - 2.4	9.3 - 6.7	15.3 - 11.1
34	10°53.5	10°55.3	10°23.7	3.4 - 2.5	9.4 - 6.8	15.4 - 11.2
35	10°53.8	10°55.5	10°24.0	3.5 - 2.5	9.5 - 6.9	15.5 - 11.2
36	10°54.0	10°55.8	10°24.2	3.6 - 2.6	9.6 - 7.0	15.6 - 11.3
37	10°54.3	10°56.0	10°24.4	3.7 - 2.7	9.7 - 7.0	15.7 - 11.4
38	10°54.5	10°56.3	10°24.7	3.8 - 2.8	9.8 - 7.1	15.8 - 11.5
39	10°54.7	10°56.5	10°24.9	3.9 - 2.8	9.9 - 7.2	15.9 - 11.5
40	10°55.0	10°56.8	10°25.2	4.0 - 2.9	10.0 - 7.3	16.0 - 11.6
41	10°55.2	10°57.0	10°25.4	4.1 - 3.0	10.1 - 7.3	16.1 - 11.7
42	10°55.5	10°57.3	10°25.6	4.2 - 3.0	10.2 - 7.4	16.2 - 11.7
43	10°55.8	10°57.5	10°25.9	4.3 - 3.1	10.3 - 7.5	16.3 - 11.8
44	10°56.0	10°57.8	10°26.1	4.4 - 3.2	10.4 - 7.5	16.4 - 11.9
45	10°56.2	10°58.0	10°26.4	4.5 - 3.3	10.5 - 7.6	16.5 - 12.0
46	10°56.5	10°58.3	10°26.6	4.6 - 3.3	10.6 - 7.7	16.6 - 12.0
47	10°56.7	10°58.5	10°26.8	4.7 - 3.4	10.7 - 7.8	16.7 - 12.1
48	10°57.0	10°58.8	10°27.1	4.8 - 3.5	10.8 - 7.8	16.8 - 12.2
49	10°57.3	10°59.0	10°27.3	4.9 - 3.6	10.9 - 7.9	16.9 - 12.3
50	10°57.5	10°59.3	10°27.5	5.0 - 3.6	11.0 - 8.0	17.0 - 12.3
51	10°57.8	10°59.5	10°27.8	5.1 - 3.7	11.1 - 8.0	17.1 - 12.4
52	10°58.0	10°59.8	10°28.0	5.2 - 3.8	11.2 - 8.1	17.2 - 12.5
53	10°58.2	11°00.0	10°28.3	5.3 - 3.8	11.3 - 8.2	17.3 - 12.5
54	10°58.5	11°00.3	10°28.5	5.4 - 3.9	11.4 - 8.3	17.4 - 12.6
55	10°58.7	11°00.6	10°28.7	5.5 - 4.0	11.5 - 8.3	17.5 - 12.7
56	10°59.0	11°00.8	10°29.0	5.6 - 4.1	11.6 - 8.4	17.6 - 12.8
57	10°59.3	11°01.1	10°29.2	5.7 - 4.1	11.7 - 8.5	17.7 - 12.8
58	10°59.5	11°01.3	10°29.5	5.8 - 4.2	11.8 - 8.6	17.8 - 12.9
59	10°59.8	11°01.6	10°29.7	5.9 - 4.3	11.9 - 8.6	17.9 - 13.0

m 44	Sun Plan.	Aries	Moon	v and d corr		
0	11°00.0	11°01.8	10°29.9	0.0 - 0.0	6.0 - 4.5	12.0 - 8.9
1	11°00.2	11°02.1	10°30.2	0.1 - 0.1	6.1 - 4.5	12.1 - 9.0
2	11°00.5	11°02.3	10°30.4	0.2 - 0.1	6.2 - 4.6	12.2 - 9.0
3	11°00.7	11°02.6	10°30.6	0.3 - 0.2	6.3 - 4.7	12.3 - 9.1
4	11°01.0	11°02.8	10°30.9	0.4 - 0.3	6.4 - 4.7	12.4 - 9.2
5	11°01.3	11°03.1	10°31.1	0.5 - 0.4	6.5 - 4.8	12.5 - 9.3
6	11°01.5	11°03.3	10°31.4	0.6 - 0.4	6.6 - 4.9	12.6 - 9.3
7	11°01.8	11°03.6	10°31.6	0.7 - 0.5	6.7 - 5.0	12.7 - 9.4
8	11°02.0	11°03.8	10°31.8	0.8 - 0.6	6.8 - 5.0	12.8 - 9.5
9	11°02.2	11°04.1	10°32.1	0.9 - 0.7	6.9 - 5.1	12.9 - 9.6
10	11°02.5	11°04.3	10°32.3	1.0 - 0.7	7.0 - 5.2	13.0 - 9.6
11	11°02.7	11°04.6	10°32.6	1.1 - 0.8	7.1 - 5.3	13.1 - 9.7
12	11°03.0	11°04.8	10°32.8	1.2 - 0.9	7.2 - 5.3	13.2 - 9.8
13	11°03.3	11°05.1	10°33.0	1.3 - 1.0	7.3 - 5.4	13.3 - 9.9
14	11°03.5	11°05.3	10°33.3	1.4 - 1.0	7.4 - 5.5	13.4 - 9.9
15	11°03.8	11°05.6	10°33.5	1.5 - 1.1	7.5 - 5.6	13.5 - 10.0
16	11°04.0	11°05.8	10°33.8	1.6 - 1.2	7.6 - 5.6	13.6 - 10.1
17	11°04.2	11°06.1	10°34.0	1.7 - 1.3	7.7 - 5.7	13.7 - 10.2
18	11°04.5	11°06.3	10°34.2	1.8 - 1.3	7.8 - 5.8	13.8 - 10.2
19	11°04.8	11°06.6	10°34.5	1.9 - 1.4	7.9 - 5.9	13.9 - 10.3
20	11°05.0	11°06.8	10°34.7	2.0 - 1.5	8.0 - 5.9	14.0 - 10.4
21	11°05.3	11°07.1	10°34.9	2.1 - 1.6	8.1 - 6.0	14.1 - 10.5
22	11°05.5	11°07.3	10°35.2	2.2 - 1.6	8.2 - 6.1	14.2 - 10.5
23	11°05.7	11°07.6	10°35.4	2.3 - 1.7	8.3 - 6.2	14.3 - 10.6
24	11°06.0	11°07.8	10°35.7	2.4 - 1.8	8.4 - 6.2	14.4 - 10.7
25	11°06.2	11°08.1	10°35.9	2.5 - 1.9	8.5 - 6.3	14.5 - 10.8
26	11°06.5	11°08.3	10°36.1	2.6 - 1.9	8.6 - 6.4	14.6 - 10.8
27	11°06.8	11°08.6	10°36.4	2.7 - 2.0	8.7 - 6.5	14.7 - 10.9
28	11°07.0	11°08.8	10°36.6	2.8 - 2.1	8.8 - 6.5	14.8 - 11.0
29	11°07.3	11°09.1	10°36.9	2.9 - 2.2	8.9 - 6.6	14.9 - 11.1
30	11°07.5	11°09.3	10°37.1	3.0 - 2.2	9.0 - 6.7	15.0 - 11.1
31	11°07.7	11°09.6	10°37.3	3.1 - 2.3	9.1 - 6.7	15.1 - 11.2
32	11°08.0	11°09.8	10°37.6	3.2 - 2.4	9.2 - 6.8	15.2 - 11.3
33	11°08.2	11°10.1	10°37.8	3.3 - 2.4	9.3 - 6.9	15.3 - 11.3
34	11°08.5	11°10.3	10°38.0	3.4 - 2.5	9.4 - 7.0	15.4 - 11.4
35	11°08.8	11°10.6	10°38.3	3.5 - 2.6	9.5 - 7.0	15.5 - 11.5
36	11°09.0	11°10.8	10°38.5	3.6 - 2.7	9.6 - 7.1	15.6 - 11.6
37	11°09.3	11°11.1	10°38.8	3.7 - 2.7	9.7 - 7.2	15.7 - 11.6
38	11°09.5	11°11.3	10°39.0	3.8 - 2.8	9.8 - 7.3	15.8 - 11.7
39	11°09.7	11°11.6	10°39.2	3.9 - 2.9	9.9 - 7.3	15.9 - 11.8
40	11°10.0	11°11.8	10°39.5	4.0 - 3.0	10.0 - 7.4	16.0 - 11.9
41	11°10.2	11°12.1	10°39.7	4.1 - 3.0	10.1 - 7.5	16.1 - 11.9
42	11°10.5	11°12.3	10°40.0	4.2 - 3.1	10.2 - 7.6	16.2 - 12.0
43	11°10.8	11°12.6	10°40.2	4.3 - 3.2	10.3 - 7.6	16.3 - 12.1
44	11°11.0	11°12.8	10°40.4	4.4 - 3.3	10.4 - 7.7	16.4 - 12.2
45	11°11.2	11°13.1	10°40.7	4.5 - 3.3	10.5 - 7.8	16.5 - 12.2
46	11°11.5	11°13.3	10°40.9	4.6 - 3.4	10.6 - 7.9	16.6 - 12.3
47	11°11.7	11°13.6	10°41.1	4.7 - 3.5	10.7 - 7.9	16.7 - 12.4
48	11°12.0	11°13.8	10°41.4	4.8 - 3.6	10.8 - 8.0	16.8 - 12.5
49	11°12.3	11°14.1	10°41.6	4.9 - 3.6	10.9 - 8.1	16.9 - 12.5
50	11°12.5	11°14.3	10°41.9	5.0 - 3.7	11.0 - 8.2	17.0 - 12.6
51	11°12.8	11°14.6	10°42.1	5.1 - 3.8	11.1 - 8.2	17.1 - 12.7
52	11°13.0	11°14.8	10°42.3	5.2 - 3.9	11.2 - 8.3	17.2 - 12.8
53	11°13.2	11°15.1	10°42.6	5.3 - 3.9	11.3 - 8.4	17.3 - 12.8
54	11°13.5	11°15.3	10°42.8	5.4 - 4.0	11.4 - 8.5	17.4 - 12.9
55	11°13.7	11°15.6	10°43.1	5.5 - 4.1	11.5 - 8.5	17.5 - 13.0
56	11°14.0	11°15.8	10°43.3	5.6 - 4.2	11.6 - 8.6	17.6 - 13.1
57	11°14.3	11°16.1	10°43.5	5.7 - 4.2	11.7 - 8.7	17.7 - 13.1
58	11°14.5	11°16.3	10°43.8	5.8 - 4.3	11.8 - 8.8	17.8 - 13.2
59	11°14.8	11°16.6	10°44.0	5.9 - 4.4	11.9 - 8.8	17.9 - 13.3

Increments and Corrections

m 45	Sun Plan.	Aries	Moon	v and d corr		
0	11°15.0	11°16.8	10°44.3	0.0 - 0.0	6.0 - 4.6	12.0 - 9.1
1	11°15.2	11°17.1	10°44.5	0.1 - 0.1	6.1 - 4.6	12.1 - 9.2
2	11°15.5	11°17.3	10°44.7	0.2 - 0.2	6.2 - 4.7	12.2 - 9.3
3	11°15.7	11°17.6	10°45.0	0.3 - 0.2	6.3 - 4.8	12.3 - 9.3
4	11°16.0	11°17.8	10°45.2	0.4 - 0.3	6.4 - 4.9	12.4 - 9.4
5	11°16.3	11°18.1	10°45.4	0.5 - 0.4	6.5 - 4.9	12.5 - 9.5
6	11°16.5	11°18.3	10°45.7	0.6 - 0.5	6.6 - 5.0	12.6 - 9.6
7	11°16.8	11°18.6	10°45.9	0.7 - 0.5	6.7 - 5.1	12.7 - 9.6
8	11°17.0	11°18.9	10°46.2	0.8 - 0.6	6.8 - 5.2	12.8 - 9.7
9	11°17.2	11°19.1	10°46.4	0.9 - 0.7	6.9 - 5.2	12.9 - 9.8
10	11°17.5	11°19.4	10°46.6	1.0 - 0.8	7.0 - 5.3	13.0 - 9.9
11	11°17.7	11°19.6	10°46.9	1.1 - 0.8	7.1 - 5.4	13.1 - 9.9
12	11°18.0	11°19.9	10°47.1	1.2 - 0.9	7.2 - 5.5	13.2 - 10.0
13	11°18.3	11°20.1	10°47.4	1.3 - 1.0	7.3 - 5.5	13.3 - 10.1
14	11°18.5	11°20.4	10°47.6	1.4 - 1.1	7.4 - 5.6	13.4 - 10.2
15	11°18.8	11°20.6	10°47.8	1.5 - 1.1	7.5 - 5.7	13.5 - 10.2
16	11°19.0	11°20.9	10°48.1	1.6 - 1.2	7.6 - 5.8	13.6 - 10.3
17	11°19.2	11°21.1	10°48.3	1.7 - 1.3	7.7 - 5.8	13.7 - 10.4
18	11°19.5	11°21.4	10°48.5	1.8 - 1.4	7.8 - 5.9	13.8 - 10.5
19	11°19.8	11°21.6	10°48.8	1.9 - 1.4	7.9 - 6.0	13.9 - 10.5
20	11°20.0	11°21.9	10°49.0	2.0 - 1.5	8.0 - 6.1	14.0 - 10.6
21	11°20.3	11°22.1	10°49.3	2.1 - 1.6	8.1 - 6.1	14.1 - 10.7
22	11°20.5	11°22.4	10°49.5	2.2 - 1.7	8.2 - 6.2	14.2 - 10.8
23	11°20.7	11°22.6	10°49.7	2.3 - 1.7	8.3 - 6.3	14.3 - 10.8
24	11°21.0	11°22.9	10°50.0	2.4 - 1.8	8.4 - 6.4	14.4 - 10.9
25	11°21.2	11°23.1	10°50.2	2.5 - 1.9	8.5 - 6.4	14.5 - 11.0
26	11°21.5	11°23.4	10°50.5	2.6 - 2.0	8.6 - 6.5	14.6 - 11.1
27	11°21.8	11°23.6	10°50.7	2.7 - 2.0	8.7 - 6.6	14.7 - 11.1
28	11°22.0	11°23.9	10°50.9	2.8 - 2.1	8.8 - 6.7	14.8 - 11.2
29	11°22.3	11°24.1	10°51.2	2.9 - 2.2	8.9 - 6.7	14.9 - 11.3
30	11°22.5	11°24.4	10°51.4	3.0 - 2.3	9.0 - 6.8	15.0 - 11.4
31	11°22.7	11°24.6	10°51.6	3.1 - 2.4	9.1 - 6.9	15.1 - 11.5
32	11°23.0	11°24.9	10°51.9	3.2 - 2.4	9.2 - 7.0	15.2 - 11.5
33	11°23.2	11°25.1	10°52.1	3.3 - 2.5	9.3 - 7.1	15.3 - 11.6
34	11°23.5	11°25.4	10°52.4	3.4 - 2.6	9.4 - 7.1	15.4 - 11.7
35	11°23.8	11°25.6	10°52.6	3.5 - 2.7	9.5 - 7.2	15.5 - 11.8
36	11°24.0	11°25.9	10°52.8	3.6 - 2.7	9.6 - 7.3	15.6 - 11.8
37	11°24.3	11°26.1	10°53.1	3.7 - 2.8	9.7 - 7.4	15.7 - 11.9
38	11°24.5	11°26.4	10°53.3	3.8 - 2.9	9.8 - 7.4	15.8 - 12.0
39	11°24.7	11°26.6	10°53.6	3.9 - 3.0	9.9 - 7.5	15.9 - 12.1
40	11°25.0	11°26.9	10°53.8	4.0 - 3.0	10.0 - 7.6	16.0 - 12.1
41	11°25.2	11°27.1	10°54.0	4.1 - 3.1	10.1 - 7.7	16.1 - 12.2
42	11°25.5	11°27.4	10°54.3	4.2 - 3.2	10.2 - 7.7	16.2 - 12.3
43	11°25.8	11°27.6	10°54.5	4.3 - 3.3	10.3 - 7.8	16.3 - 12.4
44	11°26.0	11°27.9	10°54.7	4.4 - 3.3	10.4 - 7.9	16.4 - 12.4
45	11°26.2	11°28.1	10°55.0	4.5 - 3.4	10.5 - 8.0	16.5 - 12.5
46	11°26.5	11°28.4	10°55.2	4.6 - 3.5	10.6 - 8.0	16.6 - 12.6
47	11°26.7	11°28.6	10°55.5	4.7 - 3.6	10.7 - 8.1	16.7 - 12.7
48	11°27.0	11°28.9	10°55.7	4.8 - 3.6	10.8 - 8.2	16.8 - 12.7
49	11°27.3	11°29.1	10°55.9	4.9 - 3.7	10.9 - 8.3	16.9 - 12.8
50	11°27.5	11°29.4	10°56.2	5.0 - 3.8	11.0 - 8.3	17.0 - 12.9
51	11°27.8	11°29.6	10°56.4	5.1 - 3.9	11.1 - 8.4	17.1 - 13.0
52	11°28.0	11°29.9	10°56.7	5.2 - 3.9	11.2 - 8.5	17.2 - 13.0
53	11°28.2	11°30.1	10°56.9	5.3 - 4.0	11.3 - 8.6	17.3 - 13.1
54	11°28.5	11°30.4	10°57.1	5.4 - 4.1	11.4 - 8.6	17.4 - 13.2
55	11°28.7	11°30.6	10°57.4	5.5 - 4.2	11.5 - 8.7	17.5 - 13.3
56	11°29.0	11°30.9	10°57.6	5.6 - 4.2	11.6 - 8.8	17.6 - 13.3
57	11°29.3	11°31.1	10°57.9	5.7 - 4.3	11.7 - 8.9	17.7 - 13.4
58	11°29.5	11°31.4	10°58.1	5.8 - 4.4	11.8 - 8.9	17.8 - 13.5
59	11°29.8	11°31.6	10°58.3	5.9 - 4.5	11.9 - 9.0	17.9 - 13.6

m 46	Sun Plan.	Aries	Moon	v and d corr		
0	11°30.0	11°31.9	10°58.6	0.0 - 0.0	6.0 - 4.7	12.0 - 9.3
1	11°30.2	11°32.1	10°58.8	0.1 - 0.1	6.1 - 4.7	12.1 - 9.4
2	11°30.5	11°32.4	10°59.0	0.2 - 0.2	6.2 - 4.8	12.2 - 9.5
3	11°30.7	11°32.6	10°59.3	0.3 - 0.2	6.3 - 4.9	12.3 - 9.5
4	11°31.0	11°32.9	10°59.5	0.4 - 0.3	6.4 - 5.0	12.4 - 9.6
5	11°31.3	11°33.1	10°59.8	0.5 - 0.4	6.5 - 5.0	12.5 - 9.7
6	11°31.5	11°33.4	10°60.0	0.6 - 0.5	6.6 - 5.1	12.6 - 9.8
7	11°31.8	11°33.6	11°00.2	0.7 - 0.5	6.7 - 5.2	12.7 - 9.8
8	11°32.0	11°33.9	11°00.5	0.8 - 0.6	6.8 - 5.3	12.8 - 9.9
9	11°32.2	11°34.1	11°00.7	0.9 - 0.7	6.9 - 5.3	12.9 - 10.0
10	11°32.5	11°34.4	11°01.0	1.0 - 0.8	7.0 - 5.4	13.0 - 10.1
11	11°32.7	11°34.6	11°01.2	1.1 - 0.9	7.1 - 5.5	13.1 - 10.2
12	11°33.0	11°34.9	11°01.4	1.2 - 0.9	7.2 - 5.6	13.2 - 10.2
13	11°33.3	11°35.1	11°01.7	1.3 - 1.0	7.3 - 5.7	13.3 - 10.3
14	11°33.5	11°35.4	11°01.9	1.4 - 1.1	7.4 - 5.7	13.4 - 10.4
15	11°33.8	11°35.6	11°02.1	1.5 - 1.2	7.5 - 5.8	13.5 - 10.5
16	11°34.0	11°35.9	11°02.4	1.6 - 1.2	7.6 - 5.9	13.6 - 10.5
17	11°34.2	11°36.1	11°02.6	1.7 - 1.3	7.7 - 6.0	13.7 - 10.6
18	11°34.5	11°36.4	11°02.9	1.8 - 1.4	7.8 - 6.0	13.8 - 10.7
19	11°34.8	11°36.6	11°03.1	1.9 - 1.5	7.9 - 6.1	13.9 - 10.8
20	11°35.0	11°36.9	11°03.3	2.0 - 1.6	8.0 - 6.2	14.0 - 10.9
21	11°35.3	11°37.2	11°03.6	2.1 - 1.6	8.1 - 6.3	14.1 - 10.9
22	11°35.5	11°37.4	11°03.8	2.2 - 1.7	8.2 - 6.4	14.2 - 11.0
23	11°35.7	11°37.7	11°04.1	2.3 - 1.8	8.3 - 6.4	14.3 - 11.1
24	11°36.0	11°37.9	11°04.3	2.4 - 1.9	8.4 - 6.5	14.4 - 11.2
25	11°36.2	11°38.2	11°04.5	2.5 - 1.9	8.5 - 6.6	14.5 - 11.2
26	11°36.5	11°38.4	11°04.8	2.6 - 2.0	8.6 - 6.7	14.6 - 11.3
27	11°36.8	11°38.7	11°05.0	2.7 - 2.1	8.7 - 6.7	14.7 - 11.4
28	11°37.0	11°38.9	11°05.2	2.8 - 2.2	8.8 - 6.8	14.8 - 11.5
29	11°37.3	11°39.2	11°05.5	2.9 - 2.2	8.9 - 6.9	14.9 - 11.5
30	11°37.5	11°39.4	11°05.7	3.0 - 2.3	9.0 - 7.0	15.0 - 11.6
31	11°37.7	11°39.7	11°06.0	3.1 - 2.4	9.1 - 7.1	15.1 - 11.7
32	11°38.0	11°39.9	11°06.2	3.2 - 2.5	9.2 - 7.1	15.2 - 11.8
33	11°38.2	11°40.2	11°06.4	3.3 - 2.6	9.3 - 7.2	15.3 - 11.9
34	11°38.5	11°40.4	11°06.7	3.4 - 2.6	9.4 - 7.3	15.4 - 11.9
35	11°38.8	11°40.7	11°06.9	3.5 - 2.7	9.5 - 7.4	15.5 - 12.0
36	11°39.0	11°40.9	11°07.2	3.6 - 2.8	9.6 - 7.4	15.6 - 12.1
37	11°39.3	11°41.2	11°07.4	3.7 - 2.9	9.7 - 7.5	15.7 - 12.2
38	11°39.5	11°41.4	11°07.6	3.8 - 2.9	9.8 - 7.6	15.8 - 12.2
39	11°39.7	11°41.7	11°07.9	3.9 - 3.0	9.9 - 7.7	15.9 - 12.3
40	11°40.0	11°41.9	11°08.1	4.0 - 3.1	10.0 - 7.8	16.0 - 12.4
41	11°40.2	11°42.2	11°08.3	4.1 - 3.2	10.1 - 7.8	16.1 - 12.5
42	11°40.5	11°42.4	11°08.6	4.2 - 3.3	10.2 - 7.9	16.2 - 12.6
43	11°40.8	11°42.7	11°08.8	4.3 - 3.3	10.3 - 8.0	16.3 - 12.6
44	11°41.0	11°42.9	11°09.1	4.4 - 3.4	10.4 - 8.1	16.4 - 12.7
45	11°41.2	11°43.2	11°09.3	4.5 - 3.5	10.5 - 8.1	16.5 - 12.8
46	11°41.5	11°43.4	11°09.5	4.6 - 3.6	10.6 - 8.2	16.6 - 12.9
47	11°41.7	11°43.7	11°09.8	4.7 - 3.6	10.7 - 8.3	16.7 - 12.9
48	11°42.0	11°43.9	11°10.0	4.8 - 3.7	10.8 - 8.4	16.8 - 13.0
49	11°42.3	11°44.2	11°10.3	4.9 - 3.8	10.9 - 8.4	16.9 - 13.1
50	11°42.5	11°44.4	11°10.5	5.0 - 3.9	11.0 - 8.5	17.0 - 13.2
51	11°42.8	11°44.7	11°10.7	5.1 - 4.0	11.1 - 8.6	17.1 - 13.3
52	11°43.0	11°44.9	11°11.0	5.2 - 4.0	11.2 - 8.7	17.2 - 13.3
53	11°43.2	11°45.2	11°11.2	5.3 - 4.1	11.3 - 8.8	17.3 - 13.4
54	11°43.5	11°45.4	11°11.5	5.4 - 4.2	11.4 - 8.8	17.4 - 13.5
55	11°43.7	11°45.7	11°11.7	5.5 - 4.3	11.5 - 8.9	17.5 - 13.6
56	11°44.0	11°45.9	11°11.9	5.6 - 4.3	11.6 - 9.0	17.6 - 13.6
57	11°44.3	11°46.2	11°12.2	5.7 - 4.4	11.7 - 9.1	17.7 - 13.7
58	11°44.5	11°46.4	11°12.4	5.8 - 4.5	11.8 - 9.1	17.8 - 13.8
59	11°44.8	11°46.7	11°12.6	5.9 - 4.6	11.9 - 9.2	17.9 - 13.9

m 47	Sun Plan.	Aries	Moon	v and d corr		
0	11°45.0	11°46.9	11°12.9	0.0 - 0.0	6.0 - 4.8	12.0 - 9.5
1	11°45.2	11°47.2	11°13.1	0.1 - 0.1	6.1 - 4.8	12.1 - 9.6
2	11°45.5	11°47.4	11°13.4	0.2 - 0.2	6.2 - 4.9	12.2 - 9.7
3	11°45.7	11°47.7	11°13.6	0.3 - 0.2	6.3 - 5.0	12.3 - 9.7
4	11°46.0	11°47.9	11°13.8	0.4 - 0.3	6.4 - 5.1	12.4 - 9.8
5	11°46.3	11°48.2	11°14.1	0.5 - 0.4	6.5 - 5.1	12.5 - 9.9
6	11°46.5	11°48.4	11°14.3	0.6 - 0.5	6.6 - 5.2	12.6 - 10.0
7	11°46.8	11°48.7	11°14.6	0.7 - 0.6	6.7 - 5.3	12.7 - 10.1
8	11°47.0	11°48.9	11°14.8	0.8 - 0.6	6.8 - 5.4	12.8 - 10.1
9	11°47.2	11°49.2	11°15.0	0.9 - 0.7	6.9 - 5.5	12.9 - 10.2
10	11°47.5	11°49.4	11°15.3	1.0 - 0.8	7.0 - 5.5	13.0 - 10.3
11	11°47.7	11°49.7	11°15.5	1.1 - 0.9	7.1 - 5.6	13.1 - 10.4
12	11°48.0	11°49.9	11°15.7	1.2 - 1.0	7.2 - 5.7	13.2 - 10.5
13	11°48.3	11°50.2	11°16.0	1.3 - 1.0	7.3 - 5.8	13.3 - 10.5
14	11°48.5	11°50.4	11°16.2	1.4 - 1.1	7.4 - 5.9	13.4 - 10.6
15	11°48.8	11°50.7	11°16.5	1.5 - 1.2	7.5 - 5.9	13.5 - 10.7
16	11°49.0	11°50.9	11°16.7	1.6 - 1.3	7.6 - 6.0	13.6 - 10.8
17	11°49.2	11°51.2	11°16.9	1.7 - 1.3	7.7 - 6.1	13.7 - 10.8
18	11°49.5	11°51.4	11°17.2	1.8 - 1.4	7.8 - 6.2	13.8 - 10.9
19	11°49.8	11°51.7	11°17.4	1.9 - 1.5	7.9 - 6.3	13.9 - 11.0
20	11°50.0	11°51.9	11°17.7	2.0 - 1.6	8.0 - 6.3	14.0 - 11.1
21	11°50.3	11°52.2	11°17.9	2.1 - 1.7	8.1 - 6.4	14.1 - 11.2
22	11°50.5	11°52.4	11°18.1	2.2 - 1.7	8.2 - 6.5	14.2 - 11.2
23	11°50.7	11°52.7	11°18.4	2.3 - 1.8	8.3 - 6.6	14.3 - 11.3
24	11°51.0	11°52.9	11°18.6	2.4 - 1.9	8.4 - 6.7	14.4 - 11.4
25	11°51.2	11°53.2	11°18.8	2.5 - 2.0	8.5 - 6.7	14.5 - 11.5
26	11°51.5	11°53.4	11°19.1	2.6 - 2.1	8.6 - 6.8	14.6 - 11.6
27	11°51.8	11°53.7	11°19.3	2.7 - 2.1	8.7 - 6.9	14.7 - 11.6
28	11°52.0	11°53.9	11°19.6	2.8 - 2.2	8.8 - 7.0	14.8 - 11.7
29	11°52.3	11°54.2	11°19.8	2.9 - 2.3	8.9 - 7.0	14.9 - 11.8
30	11°52.5	11°54.4	11°20.0	3.0 - 2.4	9.0 - 7.1	15.0 - 11.9
31	11°52.7	11°54.7	11°20.3	3.1 - 2.5	9.1 - 7.2	15.1 - 12.0
32	11°53.0	11°54.9	11°20.5	3.2 - 2.5	9.2 - 7.3	15.2 - 12.0
33	11°53.2	11°55.2	11°20.8	3.3 - 2.6	9.3 - 7.4	15.3 - 12.1
34	11°53.5	11°55.5	11°21.0	3.4 - 2.7	9.4 - 7.4	15.4 - 12.2
35	11°53.8	11°55.7	11°21.2	3.5 - 2.8	9.5 - 7.5	15.5 - 12.3
36	11°54.0	11°56.0	11°21.5	3.6 - 2.9	9.6 - 7.6	15.6 - 12.4
37	11°54.3	11°56.2	11°21.7	3.7 - 2.9	9.7 - 7.7	15.7 - 12.4
38	11°54.5	11°56.5	11°22.0	3.8 - 3.0	9.8 - 7.8	15.8 - 12.5
39	11°54.7	11°56.7	11°22.2	3.9 - 3.1	9.9 - 7.8	15.9 - 12.6
40	11°55.0	11°57.0	11°22.4	4.0 - 3.2	10.0 - 7.9	16.0 - 12.7
41	11°55.2	11°57.2	11°22.7	4.1 - 3.2	10.1 - 8.0	16.1 - 12.7
42	11°55.5	11°57.5	11°22.9	4.2 - 3.3	10.2 - 8.1	16.2 - 12.8
43	11°55.8	11°57.7	11°23.1	4.3 - 3.4	10.3 - 8.2	16.3 - 12.9
44	11°56.0	11°58.0	11°23.4	4.4 - 3.5	10.4 - 8.2	16.4 - 13.0
45	11°56.2	11°58.2	11°23.6	4.5 - 3.6	10.5 - 8.3	16.5 - 13.1
46	11°56.5	11°58.5	11°23.9	4.6 - 3.6	10.6 - 8.4	16.6 - 13.1
47	11°56.7	11°58.7	11°24.1	4.7 - 3.7	10.7 - 8.5	16.7 - 13.2
48	11°57.0	11°59.0	11°24.3	4.8 - 3.8	10.8 - 8.6	16.8 - 13.3
49	11°57.3	11°59.2	11°24.6	4.9 - 3.9	10.9 - 8.6	16.9 - 13.4
50	11°57.5	11°59.5	11°24.8	5.0 - 4.0	11.0 - 8.7	17.0 - 13.5
51	11°57.8	11°59.7	11°25.1	5.1 - 4.0	11.1 - 8.8	17.1 - 13.5
52	11°58.0	11°60.0	11°25.3	5.2 - 4.1	11.2 - 8.9	17.2 - 13.6
53	11°58.2	12°00.2	11°25.5	5.3 - 4.2	11.3 - 8.9	17.3 - 13.7
54	11°58.5	12°00.5	11°25.8	5.4 - 4.3	11.4 - 9.0	17.4 - 13.8
55	11°58.7	12°00.7	11°26.0	5.5 - 4.4	11.5 - 9.1	17.5 - 13.9
56	11°59.0	12°01.0	11°26.2	5.6 - 4.4	11.6 - 9.2	17.6 - 13.9
57	11°59.3	12°01.2	11°26.5	5.7 - 4.5	11.7 - 9.3	17.7 - 14.0
58	11°59.5	12°01.5	11°26.7	5.8 - 4.6	11.8 - 9.3	17.8 - 14.1
59	11°59.8	12°01.7	11°27.0	5.9 - 4.7	11.9 - 9.4	17.9 - 14.2

Increments and Corrections

m 48	Sun Plan.	Aries	Moon	v and d corr		
0	12°00.0	12°02.0	11°27.2	0.0 - 0.0	6.0 - 4.9	12.0 - 9.7
1	12°00.2	12°02.2	11°27.4	0.1 - 0.1	6.1 - 4.9	12.1 - 9.8
2	12°00.5	12°02.5	11°27.7	0.2 - 0.2	6.2 - 5.0	12.2 - 9.9
3	12°00.7	12°02.7	11°27.9	0.3 - 0.2	6.3 - 5.1	12.3 - 9.9
4	12°01.0	12°03.0	11°28.2	0.4 - 0.3	6.4 - 5.2	12.4 - 10.0
5	12°01.3	12°03.2	11°28.4	0.5 - 0.4	6.5 - 5.3	12.5 - 10.1
6	12°01.5	12°03.5	11°28.6	0.6 - 0.5	6.6 - 5.3	12.6 - 10.2
7	12°01.8	12°03.7	11°28.9	0.7 - 0.6	6.7 - 5.4	12.7 - 10.3
8	12°02.0	12°04.0	11°29.1	0.8 - 0.6	6.8 - 5.5	12.8 - 10.3
9	12°02.2	12°04.2	11°29.3	0.9 - 0.7	6.9 - 5.6	12.9 - 10.4
10	12°02.5	12°04.5	11°29.6	1.0 - 0.8	7.0 - 5.7	13.0 - 10.5
11	12°02.7	12°04.7	11°29.8	1.1 - 0.9	7.1 - 5.7	13.1 - 10.6
12	12°03.0	12°05.0	11°30.1	1.2 - 1.0	7.2 - 5.8	13.2 - 10.7
13	12°03.3	12°05.2	11°30.3	1.3 - 1.1	7.3 - 5.9	13.3 - 10.8
14	12°03.5	12°05.5	11°30.5	1.4 - 1.1	7.4 - 6.0	13.4 - 10.8
15	12°03.8	12°05.7	11°30.8	1.5 - 1.2	7.5 - 6.1	13.5 - 10.9
16	12°04.0	12°06.0	11°31.0	1.6 - 1.3	7.6 - 6.1	13.6 - 11.0
17	12°04.2	12°06.2	11°31.3	1.7 - 1.4	7.7 - 6.2	13.7 - 11.1
18	12°04.5	12°06.5	11°31.5	1.8 - 1.5	7.8 - 6.3	13.8 - 11.2
19	12°04.8	12°06.7	11°31.7	1.9 - 1.5	7.9 - 6.4	13.9 - 11.2
20	12°05.0	12°07.0	11°32.0	2.0 - 1.6	8.0 - 6.5	14.0 - 11.3
21	12°05.3	12°07.2	11°32.2	2.1 - 1.7	8.1 - 6.5	14.1 - 11.4
22	12°05.5	12°07.5	11°32.4	2.2 - 1.8	8.2 - 6.6	14.2 - 11.5
23	12°05.7	12°07.7	11°32.7	2.3 - 1.9	8.3 - 6.7	14.3 - 11.6
24	12°06.0	12°08.0	11°32.9	2.4 - 1.9	8.4 - 6.8	14.4 - 11.6
25	12°06.2	12°08.2	11°33.2	2.5 - 2.0	8.5 - 6.9	14.5 - 11.7
26	12°06.5	12°08.5	11°33.4	2.6 - 2.1	8.6 - 7.0	14.6 - 11.8
27	12°06.8	12°08.7	11°33.6	2.7 - 2.2	8.7 - 7.0	14.7 - 11.9
28	12°07.0	12°09.0	11°33.9	2.8 - 2.3	8.8 - 7.1	14.8 - 12.0
29	12°07.3	12°09.2	11°34.1	2.9 - 2.3	8.9 - 7.2	14.9 - 12.0
30	12°07.5	12°09.5	11°34.4	3.0 - 2.4	9.0 - 7.3	15.0 - 12.1
31	12°07.7	12°09.7	11°34.6	3.1 - 2.5	9.1 - 7.4	15.1 - 12.2
32	12°08.0	12°10.0	11°34.8	3.2 - 2.6	9.2 - 7.4	15.2 - 12.3
33	12°08.2	12°10.2	11°35.1	3.3 - 2.7	9.3 - 7.5	15.3 - 12.4
34	12°08.5	12°10.5	11°35.3	3.4 - 2.7	9.4 - 7.6	15.4 - 12.4
35	12°08.8	12°10.7	11°35.6	3.5 - 2.8	9.5 - 7.7	15.5 - 12.5
36	12°09.0	12°11.0	11°35.8	3.6 - 2.9	9.6 - 7.8	15.6 - 12.6
37	12°09.3	12°11.2	11°36.0	3.7 - 3.0	9.7 - 7.8	15.7 - 12.7
38	12°09.5	12°11.5	11°36.3	3.8 - 3.1	9.8 - 7.9	15.8 - 12.8
39	12°09.7	12°11.7	11°36.5	3.9 - 3.2	9.9 - 8.0	15.9 - 12.9
40	12°10.0	12°12.0	11°36.7	4.0 - 3.2	10.0 - 8.1	16.0 - 12.9
41	12°10.2	12°12.2	11°37.0	4.1 - 3.3	10.1 - 8.2	16.1 - 13.0
42	12°10.5	12°12.5	11°37.2	4.2 - 3.4	10.2 - 8.2	16.2 - 13.1
43	12°10.8	12°12.7	11°37.5	4.3 - 3.5	10.3 - 8.3	16.3 - 13.2
44	12°11.0	12°13.0	11°37.7	4.4 - 3.6	10.4 - 8.4	16.4 - 13.3
45	12°11.2	12°13.2	11°37.9	4.5 - 3.6	10.5 - 8.5	16.5 - 13.3
46	12°11.5	12°13.5	11°38.2	4.6 - 3.7	10.6 - 8.6	16.6 - 13.4
47	12°11.7	12°13.8	11°38.4	4.7 - 3.8	10.7 - 8.6	16.7 - 13.5
48	12°12.0	12°14.0	11°38.7	4.8 - 3.9	10.8 - 8.7	16.8 - 13.6
49	12°12.3	12°14.3	11°38.9	4.9 - 4.0	10.9 - 8.8	16.9 - 13.7
50	12°12.5	12°14.5	11°39.1	5.0 - 4.0	11.0 - 8.9	17.0 - 13.7
51	12°12.8	12°14.8	11°39.4	5.1 - 4.1	11.1 - 9.0	17.1 - 13.8
52	12°13.0	12°15.0	11°39.6	5.2 - 4.2	11.2 - 9.1	17.2 - 13.9
53	12°13.2	12°15.3	11°39.8	5.3 - 4.3	11.3 - 9.1	17.3 - 14.0
54	12°13.5	12°15.5	11°40.1	5.4 - 4.4	11.4 - 9.2	17.4 - 14.1
55	12°13.7	12°15.8	11°40.3	5.5 - 4.4	11.5 - 9.3	17.5 - 14.1
56	12°14.0	12°16.0	11°40.6	5.6 - 4.5	11.6 - 9.4	17.6 - 14.2
57	12°14.3	12°16.3	11°40.8	5.7 - 4.6	11.7 - 9.5	17.7 - 14.3
58	12°14.5	12°16.5	11°41.0	5.8 - 4.7	11.8 - 9.5	17.8 - 14.4
59	12°14.8	12°16.8	11°41.3	5.9 - 4.8	11.9 - 9.6	17.9 - 14.5

m 49	Sun Plan.	Aries	Moon	v and d corr		
0	12°15.0	12°17.0	11°41.5	0.0 - 0.0	6.0 - 4.9	12.0 - 9.9
1	12°15.2	12°17.3	11°41.8	0.1 - 0.1	6.1 - 5.0	12.1 - 10.0
2	12°15.5	12°17.5	11°42.0	0.2 - 0.2	6.2 - 5.1	12.2 - 10.1
3	12°15.7	12°17.8	11°42.2	0.3 - 0.2	6.3 - 5.2	12.3 - 10.1
4	12°16.0	12°18.0	11°42.5	0.4 - 0.3	6.4 - 5.3	12.4 - 10.2
5	12°16.3	12°18.3	11°42.7	0.5 - 0.4	6.5 - 5.4	12.5 - 10.3
6	12°16.5	12°18.5	11°42.9	0.6 - 0.5	6.6 - 5.4	12.6 - 10.4
7	12°16.8	12°18.8	11°43.2	0.7 - 0.6	6.7 - 5.5	12.7 - 10.5
8	12°17.0	12°19.0	11°43.4	0.8 - 0.7	6.8 - 5.6	12.8 - 10.6
9	12°17.2	12°19.3	11°43.7	0.9 - 0.7	6.9 - 5.7	12.9 - 10.6
10	12°17.5	12°19.5	11°43.9	1.0 - 0.8	7.0 - 5.8	13.0 - 10.7
11	12°17.7	12°19.8	11°44.1	1.1 - 0.9	7.1 - 5.9	13.1 - 10.8
12	12°18.0	12°20.0	11°44.4	1.2 - 1.0	7.2 - 5.9	13.2 - 10.9
13	12°18.3	12°20.3	11°44.6	1.3 - 1.1	7.3 - 6.0	13.3 - 11.0
14	12°18.5	12°20.5	11°44.9	1.4 - 1.2	7.4 - 6.1	13.4 - 11.1
15	12°18.8	12°20.8	11°45.1	1.5 - 1.2	7.5 - 6.2	13.5 - 11.1
16	12°19.0	12°21.0	11°45.3	1.6 - 1.3	7.6 - 6.3	13.6 - 11.2
17	12°19.2	12°21.3	11°45.6	1.7 - 1.4	7.7 - 6.4	13.7 - 11.3
18	12°19.5	12°21.5	11°45.8	1.8 - 1.5	7.8 - 6.4	13.8 - 11.4
19	12°19.8	12°21.8	11°46.1	1.9 - 1.6	7.9 - 6.5	13.9 - 11.5
20	12°20.0	12°22.0	11°46.3	2.0 - 1.7	8.0 - 6.6	14.0 - 11.5
21	12°20.3	12°22.3	11°46.5	2.1 - 1.7	8.1 - 6.7	14.1 - 11.6
22	12°20.5	12°22.5	11°46.8	2.2 - 1.8	8.2 - 6.8	14.2 - 11.7
23	12°20.7	12°22.8	11°47.0	2.3 - 1.9	8.3 - 6.8	14.3 - 11.8
24	12°21.0	12°23.0	11°47.2	2.4 - 2.0	8.4 - 6.9	14.4 - 11.9
25	12°21.2	12°23.3	11°47.5	2.5 - 2.1	8.5 - 7.0	14.5 - 12.0
26	12°21.5	12°23.5	11°47.7	2.6 - 2.1	8.6 - 7.1	14.6 - 12.0
27	12°21.8	12°23.8	11°48.0	2.7 - 2.2	8.7 - 7.2	14.7 - 12.1
28	12°22.0	12°24.0	11°48.2	2.8 - 2.3	8.8 - 7.3	14.8 - 12.2
29	12°22.3	12°24.3	11°48.4	2.9 - 2.4	8.9 - 7.3	14.9 - 12.3
30	12°22.5	12°24.5	11°48.7	3.0 - 2.5	9.0 - 7.4	15.0 - 12.4
31	12°22.7	12°24.8	11°48.9	3.1 - 2.6	9.1 - 7.5	15.1 - 12.5
32	12°23.0	12°25.0	11°49.2	3.2 - 2.6	9.2 - 7.6	15.2 - 12.5
33	12°23.2	12°25.3	11°49.4	3.3 - 2.7	9.3 - 7.7	15.3 - 12.6
34	12°23.5	12°25.5	11°49.6	3.4 - 2.8	9.4 - 7.8	15.4 - 12.7
35	12°23.8	12°25.8	11°49.9	3.5 - 2.9	9.5 - 7.8	15.5 - 12.8
36	12°24.0	12°26.0	11°50.1	3.6 - 3.0	9.6 - 7.9	15.6 - 12.9
37	12°24.3	12°26.3	11°50.3	3.7 - 3.1	9.7 - 8.0	15.7 - 13.0
38	12°24.5	12°26.5	11°50.6	3.8 - 3.1	9.8 - 8.1	15.8 - 13.0
39	12°24.7	12°26.8	11°50.8	3.9 - 3.2	9.9 - 8.2	15.9 - 13.1
40	12°25.0	12°27.0	11°51.1	4.0 - 3.3	10.0 - 8.3	16.0 - 13.2
41	12°25.2	12°27.3	11°51.3	4.1 - 3.4	10.1 - 8.3	16.1 - 13.3
42	12°25.5	12°27.5	11°51.5	4.2 - 3.5	10.2 - 8.4	16.2 - 13.4
43	12°25.8	12°27.8	11°51.8	4.3 - 3.5	10.3 - 8.5	16.3 - 13.4
44	12°26.0	12°28.0	11°52.0	4.4 - 3.6	10.4 - 8.6	16.4 - 13.5
45	12°26.2	12°28.3	11°52.3	4.5 - 3.7	10.5 - 8.7	16.5 - 13.6
46	12°26.5	12°28.5	11°52.5	4.6 - 3.8	10.6 - 8.7	16.6 - 13.7
47	12°26.7	12°28.8	11°52.7	4.7 - 3.9	10.7 - 8.8	16.7 - 13.8
48	12°27.0	12°29.0	11°53.0	4.8 - 4.0	10.8 - 8.9	16.8 - 13.9
49	12°27.3	12°29.3	11°53.2	4.9 - 4.0	10.9 - 9.0	16.9 - 13.9
50	12°27.5	12°29.5	11°53.4	5.0 - 4.1	11.0 - 9.1	17.0 - 14.0
51	12°27.8	12°29.8	11°53.7	5.1 - 4.2	11.1 - 9.2	17.1 - 14.1
52	12°28.0	12°30.0	11°53.9	5.2 - 4.3	11.2 - 9.2	17.2 - 14.2
53	12°28.2	12°30.3	11°54.2	5.3 - 4.4	11.3 - 9.3	17.3 - 14.3
54	12°28.5	12°30.5	11°54.4	5.4 - 4.5	11.4 - 9.4	17.4 - 14.4
55	12°28.7	12°30.8	11°54.6	5.5 - 4.5	11.5 - 9.5	17.5 - 14.4
56	12°29.0	12°31.0	11°54.9	5.6 - 4.6	11.6 - 9.6	17.6 - 14.5
57	12°29.3	12°31.3	11°55.1	5.7 - 4.7	11.7 - 9.7	17.7 - 14.6
58	12°29.5	12°31.5	11°55.4	5.8 - 4.8	11.8 - 9.7	17.8 - 14.7
59	12°29.8	12°31.8	11°55.6	5.9 - 4.9	11.9 - 9.8	17.9 - 14.8

m 50	Sun Plan.	Aries	Moon	v and d corr		
0	12°30.0	12°32.1	11°55.8	0.0 - 0.0	6.0 - 5.1	12.0 - 10.1
1	12°30.2	12°32.3	11°56.1	0.1 - 0.1	6.1 - 5.1	12.1 - 10.2
2	12°30.5	12°32.6	11°56.3	0.2 - 0.2	6.2 - 5.2	12.2 - 10.3
3	12°30.7	12°32.8	11°56.5	0.3 - 0.3	6.3 - 5.3	12.3 - 10.4
4	12°31.0	12°33.1	11°56.8	0.4 - 0.3	6.4 - 5.4	12.4 - 10.4
5	12°31.3	12°33.3	11°57.0	0.5 - 0.4	6.5 - 5.5	12.5 - 10.5
6	12°31.5	12°33.6	11°57.3	0.6 - 0.5	6.6 - 5.6	12.6 - 10.6
7	12°31.8	12°33.8	11°57.5	0.7 - 0.6	6.7 - 5.6	12.7 - 10.7
8	12°32.0	12°34.1	11°57.7	0.8 - 0.7	6.8 - 5.7	12.8 - 10.8
9	12°32.2	12°34.3	11°58.0	0.9 - 0.8	6.9 - 5.8	12.9 - 10.9
10	12°32.5	12°34.6	11°58.2	1.0 - 0.8	7.0 - 5.9	13.0 - 10.9
11	12°32.7	12°34.8	11°58.5	1.1 - 0.9	7.1 - 6.0	13.1 - 11.0
12	12°33.0	12°35.1	11°58.7	1.2 - 1.0	7.2 - 6.1	13.2 - 11.1
13	12°33.3	12°35.3	11°58.9	1.3 - 1.1	7.3 - 6.1	13.3 - 11.2
14	12°33.5	12°35.6	11°59.2	1.4 - 1.2	7.4 - 6.2	13.4 - 11.3
15	12°33.8	12°35.8	11°59.4	1.5 - 1.3	7.5 - 6.3	13.5 - 11.4
16	12°34.0	12°36.1	11°59.7	1.6 - 1.3	7.6 - 6.4	13.6 - 11.4
17	12°34.2	12°36.3	11°59.9	1.7 - 1.4	7.7 - 6.5	13.7 - 11.5
18	12°34.5	12°36.6	12°00.1	1.8 - 1.5	7.8 - 6.6	13.8 - 11.6
19	12°34.8	12°36.8	12°00.4	1.9 - 1.6	7.9 - 6.6	13.9 - 11.7
20	12°35.0	12°37.1	12°00.6	2.0 - 1.7	8.0 - 6.7	14.0 - 11.8
21	12°35.3	12°37.3	12°00.8	2.1 - 1.8	8.1 - 6.8	14.1 - 11.9
22	12°35.5	12°37.6	12°01.1	2.2 - 1.9	8.2 - 6.9	14.2 - 12.0
23	12°35.7	12°37.8	12°01.3	2.3 - 1.9	8.3 - 7.0	14.3 - 12.0
24	12°36.0	12°38.1	12°01.6	2.4 - 2.0	8.4 - 7.1	14.4 - 12.1
25	12°36.2	12°38.3	12°01.8	2.5 - 2.1	8.5 - 7.2	14.5 - 12.2
26	12°36.5	12°38.6	12°02.0	2.6 - 2.2	8.6 - 7.2	14.6 - 12.3
27	12°36.8	12°38.8	12°02.3	2.7 - 2.3	8.7 - 7.3	14.7 - 12.4
28	12°37.0	12°39.1	12°02.5	2.8 - 2.4	8.8 - 7.4	14.8 - 12.5
29	12°37.3	12°39.3	12°02.8	2.9 - 2.4	8.9 - 7.5	14.9 - 12.5
30	12°37.5	12°39.6	12°03.0	3.0 - 2.5	9.0 - 7.6	15.0 - 12.6
31	12°37.7	12°39.8	12°03.2	3.1 - 2.6	9.1 - 7.7	15.1 - 12.7
32	12°38.0	12°40.1	12°03.5	3.2 - 2.7	9.2 - 7.7	15.2 - 12.8
33	12°38.2	12°40.3	12°03.7	3.3 - 2.8	9.3 - 7.8	15.3 - 12.9
34	12°38.5	12°40.6	12°03.9	3.4 - 2.9	9.4 - 7.9	15.4 - 13.0
35	12°38.8	12°40.8	12°04.2	3.5 - 2.9	9.5 - 8.0	15.5 - 13.0
36	12°39.0	12°41.1	12°04.4	3.6 - 3.0	9.6 - 8.1	15.6 - 13.1
37	12°39.3	12°41.3	12°04.7	3.7 - 3.1	9.7 - 8.2	15.7 - 13.2
38	12°39.5	12°41.6	12°04.9	3.8 - 3.2	9.8 - 8.2	15.8 - 13.3
39	12°39.7	12°41.8	12°05.1	3.9 - 3.3	9.9 - 8.3	15.9 - 13.4
40	12°40.0	12°42.1	12°05.4	4.0 - 3.4	10.0 - 8.4	16.0 - 13.5
41	12°40.2	12°42.3	12°05.6	4.1 - 3.5	10.1 - 8.5	16.1 - 13.6
42	12°40.5	12°42.6	12°05.9	4.2 - 3.5	10.2 - 8.6	16.2 - 13.6
43	12°40.8	12°42.8	12°06.1	4.3 - 3.6	10.3 - 8.7	16.3 - 13.7
44	12°41.0	12°43.1	12°06.3	4.4 - 3.7	10.4 - 8.8	16.4 - 13.8
45	12°41.2	12°43.3	12°06.6	4.5 - 3.8	10.5 - 8.8	16.5 - 13.9
46	12°41.5	12°43.6	12°06.8	4.6 - 3.9	10.6 - 8.9	16.6 - 14.0
47	12°41.7	12°43.8	12°07.0	4.7 - 4.0	10.7 - 9.0	16.7 - 14.1
48	12°42.0	12°44.1	12°07.3	4.8 - 4.0	10.8 - 9.1	16.8 - 14.1
49	12°42.3	12°44.3	12°07.5	4.9 - 4.1	10.9 - 9.2	16.9 - 14.2
50	12°42.5	12°44.6	12°07.8	5.0 - 4.2	11.0 - 9.3	17.0 - 14.3
51	12°42.8	12°44.8	12°08.0	5.1 - 4.3	11.1 - 9.3	17.1 - 14.4
52	12°43.0	12°45.1	12°08.2	5.2 - 4.4	11.2 - 9.4	17.2 - 14.5
53	12°43.2	12°45.3	12°08.5	5.3 - 4.5	11.3 - 9.5	17.3 - 14.6
54	12°43.5	12°45.6	12°08.7	5.4 - 4.5	11.4 - 9.6	17.4 - 14.6
55	12°43.7	12°45.8	12°09.0	5.5 - 4.6	11.5 - 9.7	17.5 - 14.7
56	12°44.0	12°46.1	12°09.2	5.6 - 4.7	11.6 - 9.8	17.6 - 14.8
57	12°44.3	12°46.3	12°09.4	5.7 - 4.8	11.7 - 9.8	17.7 - 14.9
58	12°44.5	12°46.6	12°09.7	5.8 - 4.9	11.8 - 9.9	17.8 - 15.0
59	12°44.8	12°46.8	12°09.9	5.9 - 5.0	11.9 - 10.0	17.9 - 15.1

Increments and Corrections

m 51	Sun Plan.	Aries	Moon	v and d corr		
0	12°45.0	12°47.1	12°10.1	0.0 - 0.0	6.0 - 5.1	12.0 - 10.3
1	12°45.2	12°47.3	12°10.4	0.1 - 0.1	6.1 - 5.2	12.1 - 10.4
2	12°45.5	12°47.6	12°10.6	0.2 - 0.2	6.2 - 5.3	12.2 - 10.5
3	12°45.7	12°47.8	12°10.9	0.3 - 0.3	6.3 - 5.4	12.3 - 10.6
4	12°46.0	12°48.1	12°11.1	0.4 - 0.3	6.4 - 5.5	12.4 - 10.6
5	12°46.3	12°48.3	12°11.3	0.5 - 0.4	6.5 - 5.6	12.5 - 10.7
6	12°46.5	12°48.6	12°11.6	0.6 - 0.5	6.6 - 5.7	12.6 - 10.8
7	12°46.8	12°48.8	12°11.8	0.7 - 0.6	6.7 - 5.8	12.7 - 10.9
8	12°47.0	12°49.1	12°12.1	0.8 - 0.7	6.8 - 5.8	12.8 - 11.0
9	12°47.2	12°49.3	12°12.3	0.9 - 0.8	6.9 - 5.9	12.9 - 11.1
10	12°47.5	12°49.6	12°12.5	1.0 - 0.9	7.0 - 6.0	13.0 - 11.2
11	12°47.7	12°49.8	12°12.8	1.1 - 0.9	7.1 - 6.1	13.1 - 11.2
12	12°48.0	12°50.1	12°13.0	1.2 - 1.0	7.2 - 6.2	13.2 - 11.3
13	12°48.3	12°50.3	12°13.3	1.3 - 1.1	7.3 - 6.3	13.3 - 11.4
14	12°48.5	12°50.6	12°13.5	1.4 - 1.2	7.4 - 6.4	13.4 - 11.5
15	12°48.8	12°50.9	12°13.7	1.5 - 1.3	7.5 - 6.4	13.5 - 11.6
16	12°49.0	12°51.1	12°14.0	1.6 - 1.4	7.6 - 6.5	13.6 - 11.7
17	12°49.2	12°51.4	12°14.2	1.7 - 1.5	7.7 - 6.6	13.7 - 11.8
18	12°49.5	12°51.6	12°14.4	1.8 - 1.5	7.8 - 6.7	13.8 - 11.8
19	12°49.8	12°51.9	12°14.7	1.9 - 1.6	7.9 - 6.8	13.9 - 11.9
20	12°50.0	12°52.1	12°14.9	2.0 - 1.7	8.0 - 6.9	14.0 - 12.0
21	12°50.3	12°52.4	12°15.2	2.1 - 1.8	8.1 - 7.0	14.1 - 12.1
22	12°50.5	12°52.6	12°15.4	2.2 - 1.9	8.2 - 7.0	14.2 - 12.2
23	12°50.7	12°52.9	12°15.6	2.3 - 2.0	8.3 - 7.1	14.3 - 12.3
24	12°51.0	12°53.1	12°15.9	2.4 - 2.1	8.4 - 7.2	14.4 - 12.4
25	12°51.2	12°53.4	12°16.1	2.5 - 2.1	8.5 - 7.3	14.5 - 12.4
26	12°51.5	12°53.6	12°16.4	2.6 - 2.2	8.6 - 7.4	14.6 - 12.5
27	12°51.8	12°53.9	12°16.6	2.7 - 2.3	8.7 - 7.5	14.7 - 12.6
28	12°52.0	12°54.1	12°16.8	2.8 - 2.4	8.8 - 7.6	14.8 - 12.7
29	12°52.3	12°54.4	12°17.1	2.9 - 2.5	8.9 - 7.6	14.9 - 12.8
30	12°52.5	12°54.6	12°17.3	3.0 - 2.6	9.0 - 7.7	15.0 - 12.9
31	12°52.7	12°54.9	12°17.5	3.1 - 2.7	9.1 - 7.8	15.1 - 13.0
32	12°53.0	12°55.1	12°17.8	3.2 - 2.7	9.2 - 7.9	15.2 - 13.0
33	12°53.2	12°55.4	12°18.0	3.3 - 2.8	9.3 - 8.0	15.3 - 13.1
34	12°53.5	12°55.6	12°18.3	3.4 - 2.9	9.4 - 8.1	15.4 - 13.2
35	12°53.8	12°55.9	12°18.5	3.5 - 3.0	9.5 - 8.2	15.5 - 13.3
36	12°54.0	12°56.1	12°18.7	3.6 - 3.1	9.6 - 8.2	15.6 - 13.4
37	12°54.3	12°56.4	12°19.0	3.7 - 3.2	9.7 - 8.3	15.7 - 13.5
38	12°54.5	12°56.6	12°19.2	3.8 - 3.3	9.8 - 8.4	15.8 - 13.6
39	12°54.7	12°56.9	12°19.5	3.9 - 3.3	9.9 - 8.5	15.9 - 13.6
40	12°55.0	12°57.1	12°19.7	4.0 - 3.4	10.0 - 8.6	16.0 - 13.7
41	12°55.2	12°57.4	12°19.9	4.1 - 3.5	10.1 - 8.7	16.1 - 13.8
42	12°55.5	12°57.6	12°20.2	4.2 - 3.6	10.2 - 8.8	16.2 - 13.9
43	12°55.8	12°57.9	12°20.4	4.3 - 3.7	10.3 - 8.8	16.3 - 14.0
44	12°56.0	12°58.1	12°20.6	4.4 - 3.8	10.4 - 8.9	16.4 - 14.1
45	12°56.2	12°58.4	12°20.9	4.5 - 3.9	10.5 - 9.0	16.5 - 14.2
46	12°56.5	12°58.6	12°21.1	4.6 - 3.9	10.6 - 9.1	16.6 - 14.2
47	12°56.7	12°58.9	12°21.4	4.7 - 4.0	10.7 - 9.2	16.7 - 14.3
48	12°57.0	12°59.1	12°21.6	4.8 - 4.1	10.8 - 9.3	16.8 - 14.4
49	12°57.3	12°59.4	12°21.8	4.9 - 4.2	10.9 - 9.4	16.9 - 14.5
50	12°57.5	12°59.6	12°22.1	5.0 - 4.3	11.0 - 9.4	17.0 - 14.6
51	12°57.8	12°59.9	12°22.3	5.1 - 4.4	11.1 - 9.5	17.1 - 14.7
52	12°58.0	13°00.1	12°22.6	5.2 - 4.5	11.2 - 9.6	17.2 - 14.8
53	12°58.2	13°00.4	12°22.8	5.3 - 4.5	11.3 - 9.7	17.3 - 14.8
54	12°58.5	13°00.6	12°23.0	5.4 - 4.6	11.4 - 9.8	17.4 - 14.9
55	12°58.7	13°00.9	12°23.3	5.5 - 4.7	11.5 - 9.9	17.5 - 15.0
56	12°59.0	13°01.1	12°23.5	5.6 - 4.8	11.6 - 10.0	17.6 - 15.1
57	12°59.3	13°01.4	12°23.8	5.7 - 4.9	11.7 - 10.0	17.7 - 15.2
58	12°59.5	13°01.6	12°24.0	5.8 - 5.0	11.8 - 10.1	17.8 - 15.3
59	12°59.8	13°01.9	12°24.2	5.9 - 5.1	11.9 - 10.2	17.9 - 15.4

m 52	Sun Plan.	Aries	Moon	v and d corr		
0	13°00.0	13°02.1	12°24.5	0.0 - 0.0	6.0 - 5.3	12.0 - 10.5
1	13°00.2	13°02.4	12°24.7	0.1 - 0.1	6.1 - 5.3	12.1 - 10.6
2	13°00.5	13°02.6	12°24.9	0.2 - 0.2	6.2 - 5.4	12.2 - 10.7
3	13°00.7	13°02.9	12°25.2	0.3 - 0.3	6.3 - 5.5	12.3 - 10.8
4	13°01.0	13°03.1	12°25.4	0.4 - 0.4	6.4 - 5.6	12.4 - 10.9
5	13°01.3	13°03.4	12°25.7	0.5 - 0.4	6.5 - 5.7	12.5 - 10.9
6	13°01.5	13°03.6	12°25.9	0.6 - 0.5	6.6 - 5.8	12.6 - 11.0
7	13°01.8	13°03.9	12°26.1	0.7 - 0.6	6.7 - 5.9	12.7 - 11.1
8	13°02.0	13°04.1	12°26.4	0.8 - 0.7	6.8 - 6.0	12.8 - 11.2
9	13°02.2	13°04.4	12°26.6	0.9 - 0.8	6.9 - 6.0	12.9 - 11.3
10	13°02.5	13°04.6	12°26.9	1.0 - 0.9	7.0 - 6.1	13.0 - 11.4
11	13°02.7	13°04.9	12°27.1	1.1 - 1.0	7.1 - 6.2	13.1 - 11.5
12	13°03.0	13°05.1	12°27.3	1.2 - 1.1	7.2 - 6.3	13.2 - 11.5
13	13°03.3	13°05.4	12°27.6	1.3 - 1.1	7.3 - 6.4	13.3 - 11.6
14	13°03.5	13°05.6	12°27.8	1.4 - 1.2	7.4 - 6.5	13.4 - 11.7
15	13°03.8	13°05.9	12°28.0	1.5 - 1.3	7.5 - 6.6	13.5 - 11.8
16	13°04.0	13°06.1	12°28.3	1.6 - 1.4	7.6 - 6.7	13.6 - 11.9
17	13°04.2	13°06.4	12°28.5	1.7 - 1.5	7.7 - 6.7	13.7 - 12.0
18	13°04.5	13°06.6	12°28.8	1.8 - 1.6	7.8 - 6.8	13.8 - 12.1
19	13°04.8	13°06.9	12°29.0	1.9 - 1.7	7.9 - 6.9	13.9 - 12.2
20	13°05.0	13°07.1	12°29.2	2.0 - 1.8	8.0 - 7.0	14.0 - 12.3
21	13°05.3	13°07.4	12°29.5	2.1 - 1.8	8.1 - 7.1	14.1 - 12.3
22	13°05.5	13°07.6	12°29.7	2.2 - 1.9	8.2 - 7.2	14.2 - 12.4
23	13°05.7	13°07.9	12°30.0	2.3 - 2.0	8.3 - 7.3	14.3 - 12.5
24	13°06.0	13°08.1	12°30.2	2.4 - 2.1	8.4 - 7.4	14.4 - 12.6
25	13°06.2	13°08.4	12°30.4	2.5 - 2.2	8.5 - 7.4	14.5 - 12.7
26	13°06.5	13°08.6	12°30.7	2.6 - 2.3	8.6 - 7.5	14.6 - 12.8
27	13°06.8	13°08.9	12°30.9	2.7 - 2.4	8.7 - 7.6	14.7 - 12.9
28	13°07.0	13°09.2	12°31.1	2.8 - 2.5	8.8 - 7.7	14.8 - 13.0
29	13°07.3	13°09.4	12°31.4	2.9 - 2.5	8.9 - 7.8	14.9 - 13.0
30	13°07.5	13°09.7	12°31.6	3.0 - 2.6	9.0 - 7.9	15.0 - 13.1
31	13°07.7	13°09.9	12°31.9	3.1 - 2.7	9.1 - 8.0	15.1 - 13.2
32	13°08.0	13°10.2	12°32.1	3.2 - 2.8	9.2 - 8.0	15.2 - 13.3
33	13°08.2	13°10.4	12°32.3	3.3 - 2.9	9.3 - 8.1	15.3 - 13.4
34	13°08.5	13°10.7	12°32.6	3.4 - 3.0	9.4 - 8.2	15.4 - 13.5
35	13°08.8	13°10.9	12°32.8	3.5 - 3.1	9.5 - 8.3	15.5 - 13.6
36	13°09.0	13°11.2	12°33.1	3.6 - 3.2	9.6 - 8.4	15.6 - 13.7
37	13°09.3	13°11.4	12°33.3	3.7 - 3.2	9.7 - 8.5	15.7 - 13.7
38	13°09.5	13°11.7	12°33.5	3.8 - 3.3	9.8 - 8.6	15.8 - 13.8
39	13°09.7	13°11.9	12°33.8	3.9 - 3.4	9.9 - 8.7	15.9 - 13.9
40	13°10.0	13°12.2	12°34.0	4.0 - 3.5	10.0 - 8.8	16.0 - 14.0
41	13°10.2	13°12.4	12°34.2	4.1 - 3.6	10.1 - 8.8	16.1 - 14.1
42	13°10.5	13°12.7	12°34.5	4.2 - 3.7	10.2 - 8.9	16.2 - 14.2
43	13°10.8	13°12.9	12°34.7	4.3 - 3.8	10.3 - 9.0	16.3 - 14.3
44	13°11.0	13°13.2	12°35.0	4.4 - 3.9	10.4 - 9.1	16.4 - 14.3
45	13°11.2	13°13.4	12°35.2	4.5 - 3.9	10.5 - 9.2	16.5 - 14.4
46	13°11.5	13°13.7	12°35.4	4.6 - 4.0	10.6 - 9.3	16.6 - 14.5
47	13°11.7	13°13.9	12°35.7	4.7 - 4.1	10.7 - 9.4	16.7 - 14.6
48	13°12.0	13°14.2	12°35.9	4.8 - 4.2	10.8 - 9.5	16.8 - 14.7
49	13°12.3	13°14.4	12°36.2	4.9 - 4.3	10.9 - 9.5	16.9 - 14.8
50	13°12.5	13°14.7	12°36.4	5.0 - 4.4	11.0 - 9.6	17.0 - 14.9
51	13°12.8	13°14.9	12°36.6	5.1 - 4.5	11.1 - 9.7	17.1 - 15.0
52	13°13.0	13°15.2	12°36.9	5.2 - 4.6	11.2 - 9.8	17.2 - 15.1
53	13°13.2	13°15.4	12°37.1	5.3 - 4.6	11.3 - 9.9	17.3 - 15.1
54	13°13.5	13°15.7	12°37.4	5.4 - 4.7	11.4 - 10.0	17.4 - 15.2
55	13°13.7	13°15.9	12°37.6	5.5 - 4.8	11.5 - 10.1	17.5 - 15.3
56	13°14.0	13°16.2	12°37.8	5.6 - 4.9	11.6 - 10.2	17.6 - 15.4
57	13°14.3	13°16.4	12°38.1	5.7 - 5.0	11.7 - 10.2	17.7 - 15.5
58	13°14.5	13°16.7	12°38.3	5.8 - 5.1	11.8 - 10.3	17.8 - 15.6
59	13°14.8	13°16.9	12°38.5	5.9 - 5.2	11.9 - 10.4	17.9 - 15.7

m 53	Sun Plan.	Aries	Moon	v and d corr		
0	13°15.0	13°17.2	12°38.8	0.0 - 0.0	6.0 - 5.4	12.0 - 10.7
1	13°15.2	13°17.4	12°39.0	0.1 - 0.1	6.1 - 5.4	12.1 - 10.8
2	13°15.5	13°17.7	12°39.3	0.2 - 0.2	6.2 - 5.5	12.2 - 10.9
3	13°15.7	13°17.9	12°39.5	0.3 - 0.3	6.3 - 5.6	12.3 - 11.0
4	13°16.0	13°18.2	12°39.7	0.4 - 0.4	6.4 - 5.7	12.4 - 11.1
5	13°16.3	13°18.4	12°40.0	0.5 - 0.4	6.5 - 5.8	12.5 - 11.1
6	13°16.5	13°18.7	12°40.2	0.6 - 0.5	6.6 - 5.9	12.6 - 11.2
7	13°16.8	13°18.9	12°40.5	0.7 - 0.6	6.7 - 6.0	12.7 - 11.3
8	13°17.0	13°19.2	12°40.7	0.8 - 0.7	6.8 - 6.1	12.8 - 11.4
9	13°17.2	13°19.4	12°40.9	0.9 - 0.8	6.9 - 6.2	12.9 - 11.5
10	13°17.5	13°19.7	12°41.2	1.0 - 0.9	7.0 - 6.2	13.0 - 11.6
11	13°17.7	13°19.9	12°41.4	1.1 - 1.0	7.1 - 6.3	13.1 - 11.7
12	13°18.0	13°20.2	12°41.6	1.2 - 1.1	7.2 - 6.4	13.2 - 11.8
13	13°18.3	13°20.4	12°41.9	1.3 - 1.2	7.3 - 6.5	13.3 - 11.9
14	13°18.5	13°20.7	12°42.1	1.4 - 1.2	7.4 - 6.6	13.4 - 11.9
15	13°18.8	13°20.9	12°42.4	1.5 - 1.3	7.5 - 6.7	13.5 - 12.0
16	13°19.0	13°21.2	12°42.6	1.6 - 1.4	7.6 - 6.8	13.6 - 12.1
17	13°19.2	13°21.4	12°42.8	1.7 - 1.5	7.7 - 6.9	13.7 - 12.2
18	13°19.5	13°21.7	12°43.1	1.8 - 1.6	7.8 - 7.0	13.8 - 12.3
19	13°19.8	13°21.9	12°43.3	1.9 - 1.7	7.9 - 7.0	13.9 - 12.4
20	13°20.0	13°22.2	12°43.6	2.0 - 1.8	8.0 - 7.1	14.0 - 12.5
21	13°20.3	13°22.4	12°43.8	2.1 - 1.9	8.1 - 7.2	14.1 - 12.6
22	13°20.5	13°22.7	12°44.0	2.2 - 2.0	8.2 - 7.3	14.2 - 12.7
23	13°20.7	13°22.9	12°44.3	2.3 - 2.1	8.3 - 7.4	14.3 - 12.8
24	13°21.0	13°23.2	12°44.5	2.4 - 2.1	8.4 - 7.5	14.4 - 12.8
25	13°21.2	13°23.4	12°44.7	2.5 - 2.2	8.5 - 7.6	14.5 - 12.9
26	13°21.5	13°23.7	12°45.0	2.6 - 2.3	8.6 - 7.7	14.6 - 13.0
27	13°21.8	13°23.9	12°45.2	2.7 - 2.4	8.7 - 7.8	14.7 - 13.1
28	13°22.0	13°24.2	12°45.5	2.8 - 2.5	8.8 - 7.8	14.8 - 13.2
29	13°22.3	13°24.4	12°45.7	2.9 - 2.6	8.9 - 7.9	14.9 - 13.3
30	13°22.5	13°24.7	12°45.9	3.0 - 2.7	9.0 - 8.0	15.0 - 13.4
31	13°22.7	13°24.9	12°46.2	3.1 - 2.8	9.1 - 8.1	15.1 - 13.5
32	13°23.0	13°25.2	12°46.4	3.2 - 2.9	9.2 - 8.2	15.2 - 13.6
33	13°23.2	13°25.4	12°46.7	3.3 - 2.9	9.3 - 8.3	15.3 - 13.6
34	13°23.5	13°25.7	12°46.9	3.4 - 3.0	9.4 - 8.4	15.4 - 13.7
35	13°23.8	13°25.9	12°47.1	3.5 - 3.1	9.5 - 8.5	15.5 - 13.8
36	13°24.0	13°26.2	12°47.4	3.6 - 3.2	9.6 - 8.6	15.6 - 13.9
37	13°24.3	13°26.4	12°47.6	3.7 - 3.3	9.7 - 8.6	15.7 - 14.0
38	13°24.5	13°26.7	12°47.9	3.8 - 3.4	9.8 - 8.7	15.8 - 14.1
39	13°24.7	13°26.9	12°48.1	3.9 - 3.5	9.9 - 8.8	15.9 - 14.2
40	13°25.0	13°27.2	12°48.3	4.0 - 3.6	10.0 - 8.9	16.0 - 14.3
41	13°25.2	13°27.5	12°48.6	4.1 - 3.7	10.1 - 9.0	16.1 - 14.4
42	13°25.5	13°27.7	12°48.8	4.2 - 3.7	10.2 - 9.1	16.2 - 14.4
43	13°25.8	13°28.0	12°49.0	4.3 - 3.8	10.3 - 9.2	16.3 - 14.5
44	13°26.0	13°28.2	12°49.3	4.4 - 3.9	10.4 - 9.3	16.4 - 14.6
45	13°26.2	13°28.5	12°49.5	4.5 - 4.0	10.5 - 9.4	16.5 - 14.7
46	13°26.5	13°28.7	12°49.8	4.6 - 4.1	10.6 - 9.5	16.6 - 14.8
47	13°26.7	13°29.0	12°50.0	4.7 - 4.2	10.7 - 9.5	16.7 - 14.9
48	13°27.0	13°29.2	12°50.2	4.8 - 4.3	10.8 - 9.6	16.8 - 15.0
49	13°27.3	13°29.5	12°50.5	4.9 - 4.4	10.9 - 9.7	16.9 - 15.1
50	13°27.5	13°29.7	12°50.7	5.0 - 4.5	11.0 - 9.8	17.0 - 15.2
51	13°27.8	13°30.0	12°51.0	5.1 - 4.5	11.1 - 9.9	17.1 - 15.2
52	13°28.0	13°30.2	12°51.2	5.2 - 4.6	11.2 - 10.0	17.2 - 15.3
53	13°28.2	13°30.5	12°51.4	5.3 - 4.7	11.3 - 10.1	17.3 - 15.4
54	13°28.5	13°30.7	12°51.7	5.4 - 4.8	11.4 - 10.2	17.4 - 15.5
55	13°28.7	13°31.0	12°51.9	5.5 - 4.9	11.5 - 10.3	17.5 - 15.6
56	13°29.0	13°31.2	12°52.1	5.6 - 5.0	11.6 - 10.3	17.6 - 15.7
57	13°29.3	13°31.5	12°52.4	5.7 - 5.1	11.7 - 10.4	17.7 - 15.8
58	13°29.5	13°31.7	12°52.6	5.8 - 5.2	11.8 - 10.5	17.8 - 15.9
59	13°29.8	13°32.0	12°52.9	5.9 - 5.3	11.9 - 10.6	17.9 - 16.0

Increments and Corrections

m 54	Sun Plan.	Aries	Moon	v and d corr		
0	13°30.0	13°32.2	12°53.1	0.0 - 0.0	6.0 - 5.5	12.0 - 10.9
1	13°30.2	13°32.5	12°53.3	0.1 - 0.1	6.1 - 5.5	12.1 - 11.0
2	13°30.5	13°32.7	12°53.6	0.2 - 0.2	6.2 - 5.6	12.2 - 11.1
3	13°30.7	13°33.0	12°53.8	0.3 - 0.3	6.3 - 5.7	12.3 - 11.2
4	13°31.0	13°33.2	12°54.1	0.4 - 0.4	6.4 - 5.8	12.4 - 11.3
5	13°31.3	13°33.5	12°54.3	0.5 - 0.5	6.5 - 5.9	12.5 - 11.4
6	13°31.5	13°33.7	12°54.5	0.6 - 0.5	6.6 - 6.0	12.6 - 11.4
7	13°31.8	13°34.0	12°54.8	0.7 - 0.6	6.7 - 6.1	12.7 - 11.5
8	13°32.0	13°34.2	12°55.0	0.8 - 0.7	6.8 - 6.2	12.8 - 11.6
9	13°32.2	13°34.5	12°55.2	0.9 - 0.8	6.9 - 6.3	12.9 - 11.7
10	13°32.5	13°34.7	12°55.5	1.0 - 0.9	7.0 - 6.4	13.0 - 11.8
11	13°32.7	13°35.0	12°55.7	1.1 - 1.0	7.1 - 6.4	13.1 - 11.9
12	13°33.0	13°35.2	12°56.0	1.2 - 1.1	7.2 - 6.5	13.2 - 12.0
13	13°33.3	13°35.5	12°56.2	1.3 - 1.2	7.3 - 6.6	13.3 - 12.1
14	13°33.5	13°35.7	12°56.4	1.4 - 1.3	7.4 - 6.7	13.4 - 12.2
15	13°33.8	13°36.0	12°56.7	1.5 - 1.4	7.5 - 6.8	13.5 - 12.3
16	13°34.0	13°36.2	12°56.9	1.6 - 1.5	7.6 - 6.9	13.6 - 12.4
17	13°34.2	13°36.5	12°57.2	1.7 - 1.5	7.7 - 7.0	13.7 - 12.4
18	13°34.5	13°36.7	12°57.4	1.8 - 1.6	7.8 - 7.1	13.8 - 12.5
19	13°34.8	13°37.0	12°57.6	1.9 - 1.7	7.9 - 7.2	13.9 - 12.6
20	13°35.0	13°37.2	12°57.9	2.0 - 1.8	8.0 - 7.3	14.0 - 12.7
21	13°35.3	13°37.5	12°58.1	2.1 - 1.9	8.1 - 7.4	14.1 - 12.8
22	13°35.5	13°37.7	12°58.3	2.2 - 2.0	8.2 - 7.4	14.2 - 12.9
23	13°35.7	13°38.0	12°58.6	2.3 - 2.1	8.3 - 7.5	14.3 - 13.0
24	13°36.0	13°38.2	12°58.8	2.4 - 2.2	8.4 - 7.6	14.4 - 13.1
25	13°36.2	13°38.5	12°59.1	2.5 - 2.3	8.5 - 7.7	14.5 - 13.2
26	13°36.5	13°38.7	12°59.3	2.6 - 2.4	8.6 - 7.8	14.6 - 13.3
27	13°36.8	13°39.0	12°59.5	2.7 - 2.5	8.7 - 7.9	14.7 - 13.4
28	13°37.0	13°39.2	12°59.8	2.8 - 2.5	8.8 - 8.0	14.8 - 13.4
29	13°37.3	13°39.5	13°00.0	2.9 - 2.6	8.9 - 8.1	14.9 - 13.5
30	13°37.5	13°39.7	13°00.3	3.0 - 2.7	9.0 - 8.2	15.0 - 13.6
31	13°37.7	13°40.0	13°00.5	3.1 - 2.8	9.1 - 8.3	15.1 - 13.7
32	13°38.0	13°40.2	13°00.7	3.2 - 2.9	9.2 - 8.4	15.2 - 13.8
33	13°38.2	13°40.5	13°01.0	3.3 - 3.0	9.3 - 8.4	15.3 - 13.9
34	13°38.5	13°40.7	13°01.2	3.4 - 3.1	9.4 - 8.5	15.4 - 14.0
35	13°38.8	13°41.0	13°01.5	3.5 - 3.2	9.5 - 8.6	15.5 - 14.1
36	13°39.0	13°41.2	13°01.7	3.6 - 3.3	9.6 - 8.7	15.6 - 14.2
37	13°39.3	13°41.5	13°01.9	3.7 - 3.4	9.7 - 8.8	15.7 - 14.3
38	13°39.5	13°41.7	13°02.2	3.8 - 3.5	9.8 - 8.9	15.8 - 14.4
39	13°39.7	13°42.0	13°02.4	3.9 - 3.5	9.9 - 9.0	15.9 - 14.4
40	13°40.0	13°42.2	13°02.6	4.0 - 3.6	10.0 - 9.1	16.0 - 14.5
41	13°40.2	13°42.5	13°02.9	4.1 - 3.7	10.1 - 9.2	16.1 - 14.6
42	13°40.5	13°42.7	13°03.1	4.2 - 3.8	10.2 - 9.3	16.2 - 14.7
43	13°40.8	13°43.0	13°03.4	4.3 - 3.9	10.3 - 9.4	16.3 - 14.8
44	13°41.0	13°43.2	13°03.6	4.4 - 4.0	10.4 - 9.4	16.4 - 14.9
45	13°41.2	13°43.5	13°03.8	4.5 - 4.1	10.5 - 9.5	16.5 - 15.0
46	13°41.5	13°43.7	13°04.1	4.6 - 4.2	10.6 - 9.6	16.6 - 15.1
47	13°41.7	13°44.0	13°04.3	4.7 - 4.3	10.7 - 9.7	16.7 - 15.2
48	13°42.0	13°44.2	13°04.6	4.8 - 4.4	10.8 - 9.8	16.8 - 15.3
49	13°42.3	13°44.5	13°04.8	4.9 - 4.5	10.9 - 9.9	16.9 - 15.4
50	13°42.5	13°44.7	13°05.0	5.0 - 4.5	11.0 - 10.0	17.0 - 15.4
51	13°42.8	13°45.0	13°05.3	5.1 - 4.6	11.1 - 10.1	17.1 - 15.5
52	13°43.0	13°45.2	13°05.5	5.2 - 4.7	11.2 - 10.2	17.2 - 15.6
53	13°43.2	13°45.5	13°05.7	5.3 - 4.8	11.3 - 10.3	17.3 - 15.7
54	13°43.5	13°45.8	13°06.0	5.4 - 4.9	11.4 - 10.4	17.4 - 15.8
55	13°43.7	13°46.0	13°06.2	5.5 - 5.0	11.5 - 10.4	17.5 - 15.9
56	13°44.0	13°46.3	13°06.5	5.6 - 5.1	11.6 - 10.5	17.6 - 16.0
57	13°44.3	13°46.5	13°06.7	5.7 - 5.2	11.7 - 10.6	17.7 - 16.1
58	13°44.5	13°46.8	13°06.9	5.8 - 5.3	11.8 - 10.7	17.8 - 16.2
59	13°44.8	13°47.0	13°07.2	5.9 - 5.4	11.9 - 10.8	17.9 - 16.3

m 55	Sun Plan.	Aries	Moon	v and d corr		
0	13°45.0	13°47.3	13°07.4	0.0 - 0.0	6.0 - 5.6	12.0 - 11.1
1	13°45.2	13°47.5	13°07.7	0.1 - 0.1	6.1 - 5.6	12.1 - 11.2
2	13°45.5	13°47.8	13°07.9	0.2 - 0.2	6.2 - 5.7	12.2 - 11.3
3	13°45.7	13°48.0	13°08.1	0.3 - 0.3	6.3 - 5.8	12.3 - 11.4
4	13°46.0	13°48.3	13°08.4	0.4 - 0.4	6.4 - 5.9	12.4 - 11.5
5	13°46.3	13°48.5	13°08.6	0.5 - 0.5	6.5 - 6.0	12.5 - 11.6
6	13°46.5	13°48.8	13°08.8	0.6 - 0.6	6.6 - 6.1	12.6 - 11.7
7	13°46.8	13°49.0	13°09.1	0.7 - 0.6	6.7 - 6.2	12.7 - 11.7
8	13°47.0	13°49.3	13°09.3	0.8 - 0.7	6.8 - 6.3	12.8 - 11.8
9	13°47.2	13°49.5	13°09.6	0.9 - 0.8	6.9 - 6.4	12.9 - 11.9
10	13°47.5	13°49.8	13°09.8	1.0 - 0.9	7.0 - 6.5	13.0 - 12.0
11	13°47.7	13°50.0	13°10.0	1.1 - 1.0	7.1 - 6.6	13.1 - 12.1
12	13°48.0	13°50.3	13°10.3	1.2 - 1.1	7.2 - 6.7	13.2 - 12.2
13	13°48.3	13°50.5	13°10.5	1.3 - 1.2	7.3 - 6.8	13.3 - 12.3
14	13°48.5	13°50.8	13°10.8	1.4 - 1.3	7.4 - 6.8	13.4 - 12.4
15	13°48.8	13°51.0	13°11.0	1.5 - 1.4	7.5 - 6.9	13.5 - 12.5
16	13°49.0	13°51.3	13°11.2	1.6 - 1.5	7.6 - 7.0	13.6 - 12.6
17	13°49.2	13°51.5	13°11.5	1.7 - 1.6	7.7 - 7.1	13.7 - 12.7
18	13°49.5	13°51.8	13°11.7	1.8 - 1.7	7.8 - 7.2	13.8 - 12.8
19	13°49.8	13°52.0	13°12.0	1.9 - 1.8	7.9 - 7.3	13.9 - 12.9
20	13°50.0	13°52.3	13°12.2	2.0 - 1.9	8.0 - 7.4	14.0 - 13.0
21	13°50.3	13°52.5	13°12.4	2.1 - 1.9	8.1 - 7.5	14.1 - 13.0
22	13°50.5	13°52.8	13°12.7	2.2 - 2.0	8.2 - 7.6	14.2 - 13.1
23	13°50.7	13°53.0	13°12.9	2.3 - 2.1	8.3 - 7.7	14.3 - 13.2
24	13°51.0	13°53.3	13°13.1	2.4 - 2.2	8.4 - 7.8	14.4 - 13.3
25	13°51.2	13°53.5	13°13.4	2.5 - 2.3	8.5 - 7.9	14.5 - 13.4
26	13°51.5	13°53.8	13°13.6	2.6 - 2.4	8.6 - 8.0	14.6 - 13.5
27	13°51.8	13°54.0	13°13.9	2.7 - 2.5	8.7 - 8.0	14.7 - 13.6
28	13°52.0	13°54.3	13°14.1	2.8 - 2.6	8.8 - 8.1	14.8 - 13.7
29	13°52.3	13°54.5	13°14.3	2.9 - 2.7	8.9 - 8.2	14.9 - 13.8
30	13°52.5	13°54.8	13°14.6	3.0 - 2.8	9.0 - 8.3	15.0 - 13.9
31	13°52.7	13°55.0	13°14.8	3.1 - 2.9	9.1 - 8.4	15.1 - 14.0
32	13°53.0	13°55.3	13°15.1	3.2 - 3.0	9.2 - 8.5	15.2 - 14.1
33	13°53.2	13°55.5	13°15.3	3.3 - 3.1	9.3 - 8.6	15.3 - 14.2
34	13°53.5	13°55.8	13°15.5	3.4 - 3.1	9.4 - 8.7	15.4 - 14.2
35	13°53.8	13°56.0	13°15.8	3.5 - 3.2	9.5 - 8.8	15.5 - 14.3
36	13°54.0	13°56.3	13°16.0	3.6 - 3.3	9.6 - 8.9	15.6 - 14.4
37	13°54.3	13°56.5	13°16.2	3.7 - 3.4	9.7 - 9.0	15.7 - 14.5
38	13°54.5	13°56.8	13°16.5	3.8 - 3.5	9.8 - 9.1	15.8 - 14.6
39	13°54.7	13°57.0	13°16.7	3.9 - 3.6	9.9 - 9.2	15.9 - 14.7
40	13°55.0	13°57.3	13°17.0	4.0 - 3.7	10.0 - 9.3	16.0 - 14.8
41	13°55.2	13°57.5	13°17.2	4.1 - 3.8	10.1 - 9.3	16.1 - 14.9
42	13°55.5	13°57.8	13°17.4	4.2 - 3.9	10.2 - 9.4	16.2 - 15.0
43	13°55.8	13°58.0	13°17.7	4.3 - 4.0	10.3 - 9.5	16.3 - 15.1
44	13°56.0	13°58.3	13°17.9	4.4 - 4.1	10.4 - 9.6	16.4 - 15.2
45	13°56.2	13°58.5	13°18.2	4.5 - 4.2	10.5 - 9.7	16.5 - 15.3
46	13°56.5	13°58.8	13°18.4	4.6 - 4.3	10.6 - 9.8	16.6 - 15.4
47	13°56.7	13°59.0	13°18.6	4.7 - 4.3	10.7 - 9.9	16.7 - 15.4
48	13°57.0	13°59.3	13°18.9	4.8 - 4.4	10.8 - 10.0	16.8 - 15.5
49	13°57.3	13°59.5	13°19.1	4.9 - 4.5	10.9 - 10.1	16.9 - 15.6
50	13°57.5	13°59.8	13°19.3	5.0 - 4.6	11.0 - 10.2	17.0 - 15.7
51	13°57.8	14°00.0	13°19.6	5.1 - 4.7	11.1 - 10.3	17.1 - 15.8
52	13°58.0	14°00.3	13°19.8	5.2 - 4.8	11.2 - 10.4	17.2 - 15.9
53	13°58.2	14°00.5	13°20.1	5.3 - 4.9	11.3 - 10.5	17.3 - 16.0
54	13°58.5	14°00.8	13°20.3	5.4 - 5.0	11.4 - 10.5	17.4 - 16.1
55	13°58.7	14°01.0	13°20.5	5.5 - 5.1	11.5 - 10.6	17.5 - 16.2
56	13°59.0	14°01.3	13°20.8	5.6 - 5.2	11.6 - 10.7	17.6 - 16.3
57	13°59.3	14°01.5	13°21.0	5.7 - 5.3	11.7 - 10.8	17.7 - 16.4
58	13°59.5	14°01.8	13°21.3	5.8 - 5.4	11.8 - 10.9	17.8 - 16.5
59	13°59.8	14°02.0	13°21.5	5.9 - 5.5	11.9 - 11.0	17.9 - 16.6

m 56	Sun Plan.	Aries	Moon	v and d corr		
0	14°00.0	14°02.3	13°21.7	0.0 - 0.0	6.0 - 5.7	12.0 - 11.3
1	14°00.2	14°02.5	13°22.0	0.1 - 0.1	6.1 - 5.7	12.1 - 11.4
2	14°00.5	14°02.8	13°22.2	0.2 - 0.2	6.2 - 5.8	12.2 - 11.5
3	14°00.7	14°03.0	13°22.4	0.3 - 0.3	6.3 - 5.9	12.3 - 11.6
4	14°01.0	14°03.3	13°22.7	0.4 - 0.4	6.4 - 6.0	12.4 - 11.7
5	14°01.3	14°03.5	13°22.9	0.5 - 0.5	6.5 - 6.1	12.5 - 11.8
6	14°01.5	14°03.8	13°23.2	0.6 - 0.6	6.6 - 6.2	12.6 - 11.9
7	14°01.8	14°04.1	13°23.4	0.7 - 0.7	6.7 - 6.3	12.7 - 12.0
8	14°02.0	14°04.3	13°23.6	0.8 - 0.8	6.8 - 6.4	12.8 - 12.1
9	14°02.2	14°04.6	13°23.9	0.9 - 0.8	6.9 - 6.5	12.9 - 12.1
10	14°02.5	14°04.8	13°24.1	1.0 - 0.9	7.0 - 6.6	13.0 - 12.2
11	14°02.7	14°05.1	13°24.4	1.1 - 1.0	7.1 - 6.7	13.1 - 12.3
12	14°03.0	14°05.3	13°24.6	1.2 - 1.1	7.2 - 6.8	13.2 - 12.4
13	14°03.3	14°05.6	13°24.8	1.3 - 1.2	7.3 - 6.9	13.3 - 12.5
14	14°03.5	14°05.8	13°25.1	1.4 - 1.3	7.4 - 7.0	13.4 - 12.6
15	14°03.8	14°06.1	13°25.3	1.5 - 1.4	7.5 - 7.1	13.5 - 12.7
16	14°04.0	14°06.3	13°25.6	1.6 - 1.5	7.6 - 7.2	13.6 - 12.8
17	14°04.2	14°06.6	13°25.8	1.7 - 1.6	7.7 - 7.3	13.7 - 12.9
18	14°04.5	14°06.8	13°26.0	1.8 - 1.7	7.8 - 7.3	13.8 - 13.0
19	14°04.8	14°07.1	13°26.3	1.9 - 1.8	7.9 - 7.4	13.9 - 13.1
20	14°05.0	14°07.3	13°26.5	2.0 - 1.9	8.0 - 7.5	14.0 - 13.2
21	14°05.3	14°07.6	13°26.7	2.1 - 2.0	8.1 - 7.6	14.1 - 13.3
22	14°05.5	14°07.8	13°27.0	2.2 - 2.1	8.2 - 7.7	14.2 - 13.4
23	14°05.7	14°08.1	13°27.2	2.3 - 2.2	8.3 - 7.8	14.3 - 13.5
24	14°06.0	14°08.3	13°27.5	2.4 - 2.3	8.4 - 7.9	14.4 - 13.6
25	14°06.2	14°08.6	13°27.7	2.5 - 2.4	8.5 - 8.0	14.5 - 13.7
26	14°06.5	14°08.8	13°27.9	2.6 - 2.4	8.6 - 8.1	14.6 - 13.7
27	14°06.8	14°09.1	13°28.2	2.7 - 2.5	8.7 - 8.2	14.7 - 13.8
28	14°07.0	14°09.3	13°28.4	2.8 - 2.6	8.8 - 8.3	14.8 - 13.9
29	14°07.3	14°09.6	13°28.7	2.9 - 2.7	8.9 - 8.4	14.9 - 14.0
30	14°07.5	14°09.8	13°28.9	3.0 - 2.8	9.0 - 8.5	15.0 - 14.1
31	14°07.7	14°10.1	13°29.1	3.1 - 2.9	9.1 - 8.6	15.1 - 14.2
32	14°08.0	14°10.3	13°29.4	3.2 - 3.0	9.2 - 8.7	15.2 - 14.3
33	14°08.2	14°10.6	13°29.6	3.3 - 3.1	9.3 - 8.8	15.3 - 14.4
34	14°08.5	14°10.8	13°29.8	3.4 - 3.2	9.4 - 8.9	15.4 - 14.5
35	14°08.8	14°11.1	13°30.1	3.5 - 3.3	9.5 - 8.9	15.5 - 14.6
36	14°09.0	14°11.3	13°30.3	3.6 - 3.4	9.6 - 9.0	15.6 - 14.7
37	14°09.3	14°11.6	13°30.6	3.7 - 3.5	9.7 - 9.1	15.7 - 14.8
38	14°09.5	14°11.8	13°30.8	3.8 - 3.6	9.8 - 9.2	15.8 - 14.9
39	14°09.7	14°12.1	13°31.0	3.9 - 3.7	9.9 - 9.3	15.9 - 15.0
40	14°10.0	14°12.3	13°31.3	4.0 - 3.8	10.0 - 9.4	16.0 - 15.1
41	14°10.2	14°12.6	13°31.5	4.1 - 3.9	10.1 - 9.5	16.1 - 15.2
42	14°10.5	14°12.8	13°31.8	4.2 - 4.0	10.2 - 9.6	16.2 - 15.3
43	14°10.8	14°13.1	13°32.0	4.3 - 4.0	10.3 - 9.7	16.3 - 15.3
44	14°11.0	14°13.3	13°32.2	4.4 - 4.1	10.4 - 9.8	16.4 - 15.4
45	14°11.2	14°13.6	13°32.5	4.5 - 4.2	10.5 - 9.9	16.5 - 15.5
46	14°11.5	14°13.8	13°32.7	4.6 - 4.3	10.6 - 10.0	16.6 - 15.6
47	14°11.7	14°14.1	13°32.9	4.7 - 4.4	10.7 - 10.1	16.7 - 15.7
48	14°12.0	14°14.3	13°33.2	4.8 - 4.5	10.8 - 10.2	16.8 - 15.8
49	14°12.3	14°14.6	13°33.4	4.9 - 4.6	10.9 - 10.3	16.9 - 15.9
50	14°12.5	14°14.8	13°33.7	5.0 - 4.7	11.0 - 10.4	17.0 - 16.0
51	14°12.8	14°15.1	13°33.9	5.1 - 4.8	11.1 - 10.5	17.1 - 16.1
52	14°13.0	14°15.3	13°34.1	5.2 - 4.9	11.2 - 10.5	17.2 - 16.2
53	14°13.2	14°15.6	13°34.4	5.3 - 5.0	11.3 - 10.6	17.3 - 16.3
54	14°13.5	14°15.8	13°34.6	5.4 - 5.1	11.4 - 10.7	17.4 - 16.4
55	14°13.7	14°16.1	13°34.9	5.5 - 5.2	11.5 - 10.8	17.5 - 16.5
56	14°14.0	14°16.3	13°35.1	5.6 - 5.3	11.6 - 10.9	17.6 - 16.6
57	14°14.3	14°16.6	13°35.3	5.7 - 5.4	11.7 - 11.0	17.7 - 16.7
58	14°14.5	14°16.8	13°35.6	5.8 - 5.5	11.8 - 11.1	17.8 - 16.8
59	14°14.8	14°17.1	13°35.8	5.9 - 5.6	11.9 - 11.2	17.9 - 16.9

Increments and Corrections

m 57	Sun Plan.	Aries	Moon	v and d corr		
0	14°15.0	14°17.3	13°36.0	0.0 - 0.0	6.0 - 5.8	12.0 - 11.5
1	14°15.2	14°17.6	13°36.3	0.1 - 0.1	6.1 - 5.8	12.1 - 11.6
2	14°15.5	14°17.8	13°36.5	0.2 - 0.2	6.2 - 5.9	12.2 - 11.7
3	14°15.7	14°18.1	13°36.8	0.3 - 0.3	6.3 - 6.0	12.3 - 11.8
4	14°16.0	14°18.3	13°37.0	0.4 - 0.4	6.4 - 6.1	12.4 - 11.9
5	14°16.3	14°18.6	13°37.2	0.5 - 0.5	6.5 - 6.2	12.5 - 12.0
6	14°16.5	14°18.8	13°37.5	0.6 - 0.6	6.6 - 6.3	12.6 - 12.1
7	14°16.8	14°19.1	13°37.7	0.7 - 0.7	6.7 - 6.4	12.7 - 12.2
8	14°17.0	14°19.3	13°38.0	0.8 - 0.8	6.8 - 6.5	12.8 - 12.3
9	14°17.2	14°19.6	13°38.2	0.9 - 0.9	6.9 - 6.6	12.9 - 12.4
10	14°17.5	14°19.8	13°38.4	1.0 - 1.0	7.0 - 6.7	13.0 - 12.5
11	14°17.7	14°20.1	13°38.7	1.1 - 1.1	7.1 - 6.8	13.1 - 12.6
12	14°18.0	14°20.3	13°38.9	1.2 - 1.2	7.2 - 6.9	13.2 - 12.7
13	14°18.3	14°20.6	13°39.2	1.3 - 1.2	7.3 - 7.0	13.3 - 12.7
14	14°18.5	14°20.8	13°39.4	1.4 - 1.3	7.4 - 7.1	13.4 - 12.8
15	14°18.8	14°21.1	13°39.6	1.5 - 1.4	7.5 - 7.2	13.5 - 12.9
16	14°19.0	14°21.3	13°39.9	1.6 - 1.5	7.6 - 7.3	13.6 - 13.0
17	14°19.2	14°21.6	13°40.1	1.7 - 1.6	7.7 - 7.4	13.7 - 13.1
18	14°19.5	14°21.8	13°40.3	1.8 - 1.7	7.8 - 7.5	13.8 - 13.2
19	14°19.8	14°22.1	13°40.6	1.9 - 1.8	7.9 - 7.6	13.9 - 13.3
20	14°20.0	14°22.4	13°40.8	2.0 - 1.9	8.0 - 7.7	14.0 - 13.4
21	14°20.3	14°22.6	13°41.1	2.1 - 2.0	8.1 - 7.8	14.1 - 13.5
22	14°20.5	14°22.9	13°41.3	2.2 - 2.1	8.2 - 7.9	14.2 - 13.6
23	14°20.7	14°23.1	13°41.5	2.3 - 2.2	8.3 - 8.0	14.3 - 13.7
24	14°21.0	14°23.4	13°41.8	2.4 - 2.3	8.4 - 8.1	14.4 - 13.8
25	14°21.2	14°23.6	13°42.0	2.5 - 2.4	8.5 - 8.1	14.5 - 13.9
26	14°21.5	14°23.9	13°42.3	2.6 - 2.5	8.6 - 8.2	14.6 - 14.0
27	14°21.8	14°24.1	13°42.5	2.7 - 2.6	8.7 - 8.3	14.7 - 14.1
28	14°22.0	14°24.4	13°42.7	2.8 - 2.7	8.8 - 8.4	14.8 - 14.2
29	14°22.3	14°24.6	13°43.0	2.9 - 2.8	8.9 - 8.5	14.9 - 14.3
30	14°22.5	14°24.9	13°43.2	3.0 - 2.9	9.0 - 8.6	15.0 - 14.4
31	14°22.7	14°25.1	13°43.4	3.1 - 3.0	9.1 - 8.7	15.1 - 14.5
32	14°23.0	14°25.4	13°43.7	3.2 - 3.1	9.2 - 8.8	15.2 - 14.6
33	14°23.2	14°25.6	13°43.9	3.3 - 3.2	9.3 - 8.9	15.3 - 14.7
34	14°23.5	14°25.9	13°44.2	3.4 - 3.3	9.4 - 9.0	15.4 - 14.8
35	14°23.8	14°26.1	13°44.4	3.5 - 3.4	9.5 - 9.1	15.5 - 14.9
36	14°24.0	14°26.4	13°44.6	3.6 - 3.5	9.6 - 9.2	15.6 - 15.0
37	14°24.3	14°26.6	13°44.9	3.7 - 3.5	9.7 - 9.3	15.7 - 15.0
38	14°24.5	14°26.9	13°45.1	3.8 - 3.6	9.8 - 9.4	15.8 - 15.1
39	14°24.7	14°27.1	13°45.4	3.9 - 3.7	9.9 - 9.5	15.9 - 15.2
40	14°25.0	14°27.4	13°45.6	4.0 - 3.8	10.0 - 9.6	16.0 - 15.3
41	14°25.2	14°27.6	13°45.8	4.1 - 3.9	10.1 - 9.7	16.1 - 15.4
42	14°25.5	14°27.9	13°46.1	4.2 - 4.0	10.2 - 9.8	16.2 - 15.5
43	14°25.8	14°28.1	13°46.3	4.3 - 4.1	10.3 - 9.9	16.3 - 15.6
44	14°26.0	14°28.4	13°46.5	4.4 - 4.2	10.4 - 10.0	16.4 - 15.7
45	14°26.2	14°28.6	13°46.8	4.5 - 4.3	10.5 - 10.1	16.5 - 15.8
46	14°26.5	14°28.9	13°47.0	4.6 - 4.4	10.6 - 10.2	16.6 - 15.9
47	14°26.7	14°29.1	13°47.3	4.7 - 4.5	10.7 - 10.3	16.7 - 16.0
48	14°27.0	14°29.4	13°47.5	4.8 - 4.6	10.8 - 10.4	16.8 - 16.1
49	14°27.3	14°29.6	13°47.7	4.9 - 4.7	10.9 - 10.4	16.9 - 16.2
50	14°27.5	14°29.9	13°48.0	5.0 - 4.8	11.0 - 10.5	17.0 - 16.3
51	14°27.8	14°30.1	13°48.2	5.1 - 4.9	11.1 - 10.6	17.1 - 16.4
52	14°28.0	14°30.4	13°48.5	5.2 - 5.0	11.2 - 10.7	17.2 - 16.5
53	14°28.2	14°30.6	13°48.7	5.3 - 5.1	11.3 - 10.8	17.3 - 16.6
54	14°28.5	14°30.9	13°48.9	5.4 - 5.2	11.4 - 10.9	17.4 - 16.7
55	14°28.7	14°31.1	13°49.2	5.5 - 5.3	11.5 - 11.0	17.5 - 16.8
56	14°29.0	14°31.4	13°49.4	5.6 - 5.4	11.6 - 11.1	17.6 - 16.9
57	14°29.3	14°31.6	13°49.7	5.7 - 5.5	11.7 - 11.2	17.7 - 17.0
58	14°29.5	14°31.9	13°49.9	5.8 - 5.6	11.8 - 11.3	17.8 - 17.1
59	14°29.8	14°32.1	13°50.1	5.9 - 5.7	11.9 - 11.4	17.9 - 17.2

m 58	Sun Plan.	Aries	Moon	v and d corr		
0	14°30.0	14°32.4	13°50.4	0.0 - 0.0	6.0 - 5.9	12.0 - 11.7
1	14°30.2	14°32.6	13°50.6	0.1 - 0.1	6.1 - 5.9	12.1 - 11.8
2	14°30.5	14°32.9	13°50.8	0.2 - 0.2	6.2 - 6.0	12.2 - 11.9
3	14°30.7	14°33.1	13°51.1	0.3 - 0.3	6.3 - 6.1	12.3 - 12.0
4	14°31.0	14°33.4	13°51.3	0.4 - 0.4	6.4 - 6.2	12.4 - 12.1
5	14°31.3	14°33.6	13°51.6	0.5 - 0.5	6.5 - 6.3	12.5 - 12.2
6	14°31.5	14°33.9	13°51.8	0.6 - 0.6	6.6 - 6.4	12.6 - 12.3
7	14°31.8	14°34.1	13°52.0	0.7 - 0.7	6.7 - 6.5	12.7 - 12.4
8	14°32.0	14°34.4	13°52.3	0.8 - 0.8	6.8 - 6.6	12.8 - 12.5
9	14°32.2	14°34.6	13°52.5	0.9 - 0.9	6.9 - 6.7	12.9 - 12.6
10	14°32.5	14°34.9	13°52.8	1.0 - 1.0	7.0 - 6.8	13.0 - 12.7
11	14°32.7	14°35.1	13°53.0	1.1 - 1.1	7.1 - 6.9	13.1 - 12.8
12	14°33.0	14°35.4	13°53.2	1.2 - 1.2	7.2 - 7.0	13.2 - 12.9
13	14°33.3	14°35.6	13°53.5	1.3 - 1.3	7.3 - 7.1	13.3 - 13.0
14	14°33.5	14°35.9	13°53.7	1.4 - 1.4	7.4 - 7.2	13.4 - 13.1
15	14°33.8	14°36.1	13°53.9	1.5 - 1.5	7.5 - 7.3	13.5 - 13.2
16	14°34.0	14°36.4	13°54.2	1.6 - 1.6	7.6 - 7.4	13.6 - 13.3
17	14°34.2	14°36.6	13°54.4	1.7 - 1.7	7.7 - 7.5	13.7 - 13.4
18	14°34.5	14°36.9	13°54.7	1.8 - 1.8	7.8 - 7.6	13.8 - 13.5
19	14°34.8	14°37.1	13°54.9	1.9 - 1.9	7.9 - 7.7	13.9 - 13.6
20	14°35.0	14°37.4	13°55.1	2.0 - 2.0	8.0 - 7.8	14.0 - 13.7
21	14°35.3	14°37.6	13°55.4	2.1 - 2.0	8.1 - 7.9	14.1 - 13.7
22	14°35.5	14°37.9	13°55.6	2.2 - 2.1	8.2 - 8.0	14.2 - 13.8
23	14°35.7	14°38.1	13°55.9	2.3 - 2.2	8.3 - 8.1	14.3 - 13.9
24	14°36.0	14°38.4	13°56.1	2.4 - 2.3	8.4 - 8.2	14.4 - 14.0
25	14°36.2	14°38.6	13°56.3	2.5 - 2.4	8.5 - 8.3	14.5 - 14.1
26	14°36.5	14°38.9	13°56.6	2.6 - 2.5	8.6 - 8.4	14.6 - 14.2
27	14°36.8	14°39.1	13°56.8	2.7 - 2.6	8.7 - 8.5	14.7 - 14.3
28	14°37.0	14°39.4	13°57.0	2.8 - 2.7	8.8 - 8.6	14.8 - 14.4
29	14°37.3	14°39.6	13°57.3	2.9 - 2.8	8.9 - 8.7	14.9 - 14.5
30	14°37.5	14°39.9	13°57.5	3.0 - 2.9	9.0 - 8.8	15.0 - 14.6
31	14°37.7	14°40.1	13°57.8	3.1 - 3.0	9.1 - 8.9	15.1 - 14.7
32	14°38.0	14°40.4	13°58.0	3.2 - 3.1	9.2 - 9.0	15.2 - 14.8
33	14°38.2	14°40.7	13°58.2	3.3 - 3.2	9.3 - 9.1	15.3 - 14.9
34	14°38.5	14°40.9	13°58.5	3.4 - 3.3	9.4 - 9.2	15.4 - 15.0
35	14°38.8	14°41.2	13°58.7	3.5 - 3.4	9.5 - 9.3	15.5 - 15.1
36	14°39.0	14°41.4	13°59.0	3.6 - 3.5	9.6 - 9.4	15.6 - 15.2
37	14°39.3	14°41.7	13°59.2	3.7 - 3.6	9.7 - 9.5	15.7 - 15.3
38	14°39.5	14°41.9	13°59.4	3.8 - 3.7	9.8 - 9.6	15.8 - 15.4
39	14°39.7	14°42.2	13°59.7	3.9 - 3.8	9.9 - 9.7	15.9 - 15.5
40	14°40.0	14°42.4	13°59.9	4.0 - 3.9	10.0 - 9.8	16.0 - 15.6
41	14°40.2	14°42.7	14°00.1	4.1 - 4.0	10.1 - 9.8	16.1 - 15.7
42	14°40.5	14°42.9	14°00.4	4.2 - 4.1	10.2 - 9.9	16.2 - 15.8
43	14°40.8	14°43.2	14°00.6	4.3 - 4.2	10.3 - 10.0	16.3 - 15.9
44	14°41.0	14°43.4	14°00.9	4.4 - 4.3	10.4 - 10.1	16.4 - 16.0
45	14°41.2	14°43.7	14°01.1	4.5 - 4.4	10.5 - 10.2	16.5 - 16.1
46	14°41.5	14°43.9	14°01.3	4.6 - 4.5	10.6 - 10.3	16.6 - 16.2
47	14°41.7	14°44.2	14°01.6	4.7 - 4.6	10.7 - 10.4	16.7 - 16.3
48	14°42.0	14°44.4	14°01.8	4.8 - 4.7	10.8 - 10.5	16.8 - 16.4
49	14°42.3	14°44.7	14°02.1	4.9 - 4.8	10.9 - 10.6	16.9 - 16.5
50	14°42.5	14°44.9	14°02.3	5.0 - 4.9	11.0 - 10.7	17.0 - 16.6
51	14°42.8	14°45.2	14°02.5	5.1 - 5.0	11.1 - 10.8	17.1 - 16.7
52	14°43.0	14°45.4	14°02.8	5.2 - 5.1	11.2 - 10.9	17.2 - 16.8
53	14°43.2	14°45.7	14°03.0	5.3 - 5.2	11.3 - 11.0	17.3 - 16.9
54	14°43.5	14°45.9	14°03.3	5.4 - 5.3	11.4 - 11.1	17.4 - 17.0
55	14°43.7	14°46.2	14°03.5	5.5 - 5.4	11.5 - 11.2	17.5 - 17.1
56	14°44.0	14°46.4	14°03.7	5.6 - 5.5	11.6 - 11.3	17.6 - 17.2
57	14°44.3	14°46.7	14°04.0	5.7 - 5.6	11.7 - 11.4	17.7 - 17.3
58	14°44.5	14°46.9	14°04.2	5.8 - 5.7	11.8 - 11.5	17.8 - 17.4
59	14°44.8	14°47.2	14°04.4	5.9 - 5.8	11.9 - 11.6	17.9 - 17.5

m 59	Sun Plan.	Aries	Moon	v and d corr		
0	14°45.0	14°47.4	14°04.7	0.0 - 0.0	6.0 - 6.0	12.0 - 11.9
1	14°45.2	14°47.7	14°04.9	0.1 - 0.1	6.1 - 6.0	12.1 - 12.0
2	14°45.5	14°47.9	14°05.2	0.2 - 0.2	6.2 - 6.1	12.2 - 12.1
3	14°45.7	14°48.2	14°05.4	0.3 - 0.3	6.3 - 6.2	12.3 - 12.2
4	14°46.0	14°48.4	14°05.6	0.4 - 0.4	6.4 - 6.3	12.4 - 12.3
5	14°46.3	14°48.7	14°05.9	0.5 - 0.5	6.5 - 6.4	12.5 - 12.4
6	14°46.5	14°48.9	14°06.1	0.6 - 0.6	6.6 - 6.5	12.6 - 12.5
7	14°46.8	14°49.2	14°06.4	0.7 - 0.7	6.7 - 6.6	12.7 - 12.6
8	14°47.0	14°49.4	14°06.6	0.8 - 0.8	6.8 - 6.7	12.8 - 12.7
9	14°47.2	14°49.7	14°06.8	0.9 - 0.9	6.9 - 6.8	12.9 - 12.8
10	14°47.5	14°49.9	14°07.1	1.0 - 1.0	7.0 - 6.9	13.0 - 12.9
11	14°47.7	14°50.2	14°07.3	1.1 - 1.1	7.1 - 7.0	13.1 - 13.0
12	14°48.0	14°50.4	14°07.5	1.2 - 1.2	7.2 - 7.1	13.2 - 13.1
13	14°48.3	14°50.7	14°07.8	1.3 - 1.3	7.3 - 7.2	13.3 - 13.2
14	14°48.5	14°50.9	14°08.0	1.4 - 1.4	7.4 - 7.3	13.4 - 13.3
15	14°48.8	14°51.2	14°08.3	1.5 - 1.5	7.5 - 7.4	13.5 - 13.4
16	14°49.0	14°51.4	14°08.5	1.6 - 1.6	7.6 - 7.5	13.6 - 13.5
17	14°49.2	14°51.7	14°08.7	1.7 - 1.7	7.7 - 7.6	13.7 - 13.6
18	14°49.5	14°51.9	14°09.0	1.8 - 1.8	7.8 - 7.7	13.8 - 13.7
19	14°49.8	14°52.2	14°09.2	1.9 - 1.9	7.9 - 7.8	13.9 - 13.8
20	14°50.0	14°52.4	14°09.5	2.0 - 2.0	8.0 - 7.9	14.0 - 13.9
21	14°50.3	14°52.7	14°09.7	2.1 - 2.1	8.1 - 8.0	14.1 - 14.0
22	14°50.5	14°52.9	14°09.9	2.2 - 2.2	8.2 - 8.1	14.2 - 14.1
23	14°50.7	14°53.2	14°10.2	2.3 - 2.3	8.3 - 8.2	14.3 - 14.2
24	14°51.0	14°53.4	14°10.4	2.4 - 2.4	8.4 - 8.3	14.4 - 14.3
25	14°51.2	14°53.7	14°10.6	2.5 - 2.5	8.5 - 8.4	14.5 - 14.4
26	14°51.5	14°53.9	14°10.9	2.6 - 2.6	8.6 - 8.5	14.6 - 14.5
27	14°51.8	14°54.2	14°11.1	2.7 - 2.7	8.7 - 8.6	14.7 - 14.6
28	14°52.0	14°54.4	14°11.4	2.8 - 2.8	8.8 - 8.7	14.8 - 14.7
29	14°52.3	14°54.7	14°11.6	2.9 - 2.9	8.9 - 8.8	14.9 - 14.8
30	14°52.5	14°54.9	14°11.8	3.0 - 3.0	9.0 - 8.9	15.0 - 14.9
31	14°52.7	14°55.2	14°12.1	3.1 - 3.1	9.1 - 9.0	15.1 - 15.0
32	14°53.0	14°55.4	14°12.3	3.2 - 3.2	9.2 - 9.1	15.2 - 15.1
33	14°53.2	14°55.7	14°12.6	3.3 - 3.3	9.3 - 9.2	15.3 - 15.2
34	14°53.5	14°55.9	14°12.8	3.4 - 3.4	9.4 - 9.3	15.4 - 15.3
35	14°53.8	14°56.2	14°13.0	3.5 - 3.5	9.5 - 9.4	15.5 - 15.4
36	14°54.0	14°56.4	14°13.3	3.6 - 3.6	9.6 - 9.5	15.6 - 15.5
37	14°54.3	14°56.7	14°13.5	3.7 - 3.7	9.7 - 9.6	15.7 - 15.6
38	14°54.5	14°56.9	14°13.8	3.8 - 3.8	9.8 - 9.7	15.8 - 15.7
39	14°54.7	14°57.2	14°14.0	3.9 - 3.9	9.9 - 9.8	15.9 - 15.8
40	14°55.0	14°57.4	14°14.2	4.0 - 4.0	10.0 - 9.9	16.0 - 15.9
41	14°55.2	14°57.7	14°14.5	4.1 - 4.1	10.1 - 10.0	16.1 - 16.0
42	14°55.5	14°57.9	14°14.7	4.2 - 4.2	10.2 - 10.1	16.2 - 16.1
43	14°55.8	14°58.2	14°14.9	4.3 - 4.3	10.3 - 10.2	16.3 - 16.2
44	14°56.0	14°58.4	14°15.2	4.4 - 4.4	10.4 - 10.3	16.4 - 16.3
45	14°56.2	14°58.7	14°15.4	4.5 - 4.5	10.5 - 10.4	16.5 - 16.4
46	14°56.5	14°59.0	14°15.7	4.6 - 4.6	10.6 - 10.5	16.6 - 16.5
47	14°56.7	14°59.2	14°15.9	4.7 - 4.7	10.7 - 10.6	16.7 - 16.6
48	14°57.0	14°59.5	14°16.1	4.8 - 4.8	10.8 - 10.7	16.8 - 16.7
49	14°57.3	14°59.7	14°16.4	4.9 - 4.9	10.9 - 10.8	16.9 - 16.8
50	14°57.5	14°60.0	14°16.6	5.0 - 5.0	11.0 - 10.9	17.0 - 16.9
51	14°57.8	15°00.2	14°16.9	5.1 - 5.1	11.1 - 11.0	17.1 - 17.0
52	14°58.0	15°00.5	14°17.1	5.2 - 5.2	11.2 - 11.1	17.2 - 17.1
53	14°58.2	15°00.7	14°17.3	5.3 - 5.3	11.3 - 11.2	17.3 - 17.2
54	14°58.5	15°01.0	14°17.6	5.4 - 5.4	11.4 - 11.3	17.4 - 17.3
55	14°58.7	15°01.2	14°17.8	5.5 - 5.5	11.5 - 11.4	17.5 - 17.4
56	14°59.0	15°01.5	14°18.0	5.6 - 5.6	11.6 - 11.5	17.6 - 17.5
57	14°59.3	15°01.7	14°18.3	5.7 - 5.7	11.7 - 11.6	17.7 - 17.6
58	14°59.5	15°02.0	14°18.5	5.8 - 5.8	11.8 - 11.7	17.8 - 17.7
59	14°59.8	15°02.2	14°18.8	5.9 - 5.9	11.9 - 11.8	17.9 - 17.8